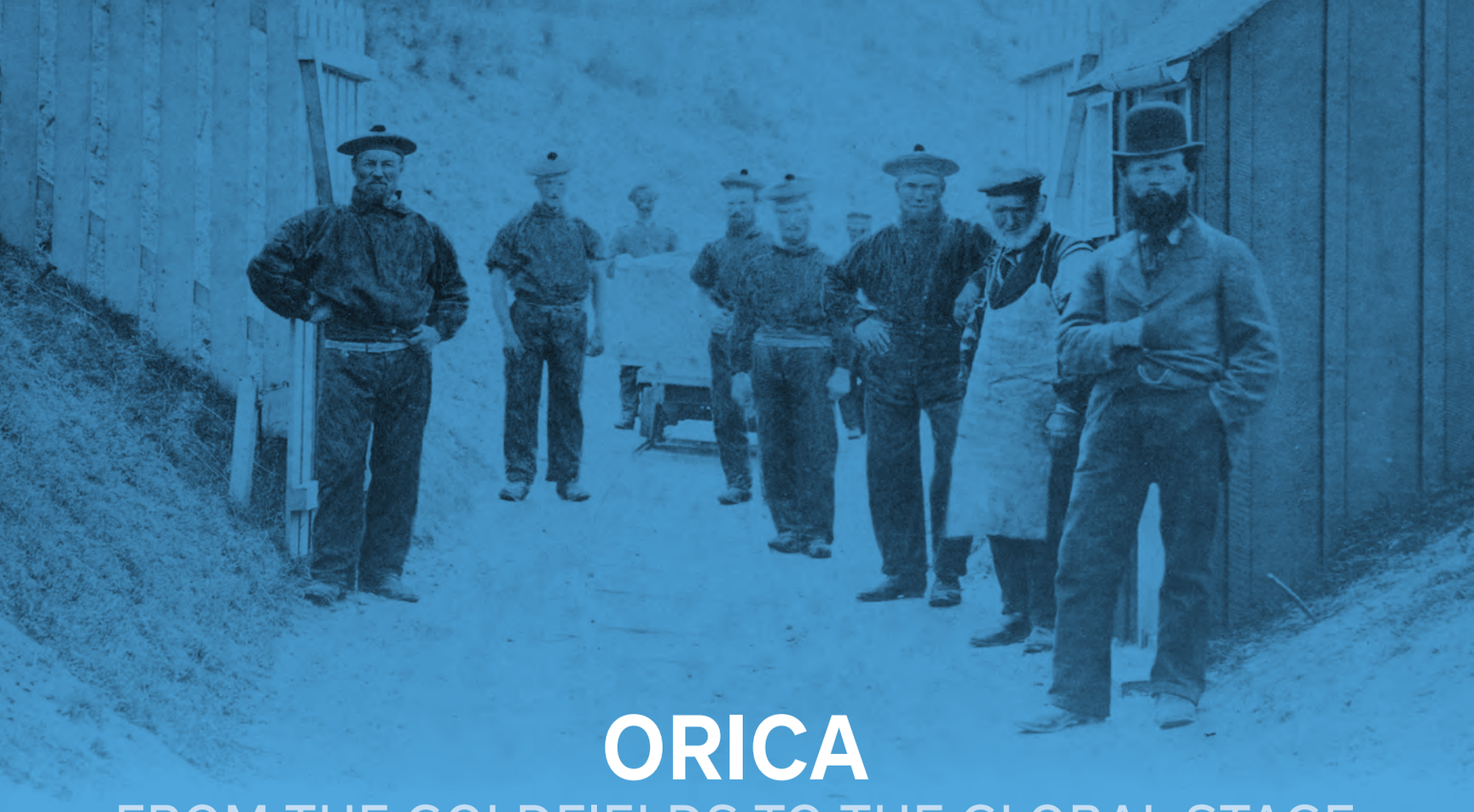

ORICA

FROM THE GOLDFIELDS TO THE GLOBAL STAGE

JOHN DURIE

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Previous spread: Digitally enabled explosives loading operations in the Hunter Valley, Australia.

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Preface

In January 2008 Akzo Nobel chief Hans Wijers triumphantly signed the US$19.2 billion deal (€11.6 billion) that would seal the end of the 81-year-old Imperial Chemical Industries (ICI) Plc.* Sixteen years later, ICI's one-time subsidiary Orica marches on, transforming itself again from its explosives base to a global mining services giant employing 12,500 people, serving customers in over a hundred countries, with more than 62 per cent of sales outside Australia and Asia.

Explosives remain the company's core, accounting for more than 75 per cent of revenues, with copper and gold making up 45 per cent of output. Not bad for a company governed by a strict covenant, with its parent detailing what products could be sold into what market. The covenant laid down what products could be imported and exported and what investments could be made, although Philip Weickhardt, the last ICI Australia chief executive, admitted he had never seen a copy of the document. It was the preserve of the company's lawyers, and something referred to in passing. In any case, in 1997 when he took over, Weickhardt's task was to lead the company to independence after 123 years of foreign rule. Negotiations, he said, were very pragmatic because Australia wanted to be on its own and ICI wanted to get out. The covenant was no longer something even the lawyers needed to know about.

ICI ultimately failed because of a corporate model that tried to serve too many different products and markets. Orica has stuck to its core, while over the years learning and benefiting from the strengths of its former parent.

The company has stayed largely outside the spotlight yet remains one of the leaders and most powerful members of corporate Australia. Its ability to transform itself from an Australian subsidiary of a British company into a global leader is unprecedented. It is also one of just a handful of companies to have sustained an expanding global reach from an Australian base.

The prevailing themes established from the early days include a celebration of research-led innovation, a drive for market leadership, support for local industry, working with government on national objectives and an expectation this would be repaid by government support.

The path to current success has seen many twists and turns along the way.

The 1850s gold rushes and subsequent minerals discoveries led to an increasing demand for explosives in Australia. In 1874 Nobel Industries' Robert Scott decided on a property west of Melbourne, near the Bendigo railroad, to house his explosives base. What at the time was called Braybrook, or Kororoit Creek, later Deer Park, became the centre of Australia's chemical industry.

Electronic blasting systems manufacturing, Brownsburg, Canada.

* In this book, the initials ICI stand for the British company, and ICIANZ for the Australian company up to 1971, when ICIANZ changed its name to ICI Australia.

Half a century later, in 1926, Nobel's Sir Harry McGowan and Brunner Mond's Sir Alfred Mond signed the framework of what would become Imperial Chemical Industries. The world was getting back to normal after World War I and British industry was preparing for the century ahead. The thinking was that the war showed Germany had the lead in chemicals, the new global industry powerhouse, and Britain must respond. The best way to combat that superiority was to combine the best in British innovation, and ICI Plc was created with the merger of Nobel Industries and Brunner Mond, United Alkali and British Dyestuffs.

The early manoeuvring to create what became ICI Australia & New Zealand (ICIANZ) was documented by Geoffrey Blainey in his 1959 unpublished history of the company to mark its first 100 years. An abridged version of Blainey's work forms the early chapters of this work and details an extraordinary saga in the history of Australian industry.

World War II saw a rapid expansion of the company's plant, products and capacity in Australia, placing ICIANZ in a rosy position to benefit from the post-war economic boom. The construction of ICI House, One Nicholson Street, Melbourne, symbolised the company's success and optimism.

The era of plastics came in the 1970s and '80s, when lifestyle-changing products emerged almost by the day in a way similar to the way technology in the last thirty years has brought us telecommunication mobility and now artificial intelligence. Explosives remained a core asset, but the company produced an incredible diversity of other products, from Selleys putty to Savlon antiseptic, chlorine for municipal water supplies to Dulux paints and PVC pipes.

In 1981 ICI Australia's chief executive, Milton Bridgland, told shareholders 'the purpose of the company is to produce chemicals and related products and services to satisfy the needs and improve the living standards of the community'. The following year he noted in the company annual report that ICI Australia was at 'the forefront of developments which have raised Australian living standards. Many of the products which are commonplace today were not known a generation ago.'

But as Sir Denys Henderson, who ran ICI Plc from 1987 to 1995, said, 'Companies don't go on forever; they must adapt to changed circumstances.' He began a period of fundamental change. He split the company into two in 1993, spinning off the pharmaceutical division to create Zeneca, now AstraZeneca. And four years later, ICI sold its 62.4 per cent stake in ICI Australia. The new Australian ICI was renamed Orica in 1998.

Orica has on any reading managed to adapt to changing market conditions far better than its parent company, given it has more than doubled in value from the ICI sale to over $7 billion and is one of the world's leading mining and infrastructure solution providers. Part of this success can be explained by the way it has kept close to its core and the historical base of the company. But executive vision is also a significant factor, and Orica has been fortunate in having had a succession of strong, effective leaders.

Milton Bridgland (CEO 1980–84), for example, brought a renewed emphasis on marketing, especially through changes at Dulux. The combination of Chris Hampson and Michael Deeley in the later 1980s and early '90s took the company to a new era of employee relations, bringing the shop floor and executives together. Deeley noted

in a paper to the Economic Planning Advisory Council in March 1991 that 'we need to move from seeing employees as an undesirable and variable cost to seeing them as an important investment as the key to improving performance through utilising their talents'.

Philip Weickhardt joined ICI in October 1971, wanting to start in London well away from his famous father, Len, who had risen through the ranks at ICIANZ to become research director from 1955 to 1970 after joining the company as a research and production chemist in 1935. As chief executive, Philip was responsible for the purchase for Orica of ICI's international explosives business, which turned the company into an Australian-based global leader and laid the basis for its future development. Almost from the day he assumed control after the untimely death of Warren Haynes, the commodity cycle turned, putting the company under severe stress just as it was standing on its own two feet.

Haynes had led ICI Australia from 1992 and, like his predecessors, believed strongly in working through the floor, not against it. He was responsible for several milestone investments, including the $235 million gas pipeline from South Australia to Botany, the $43 million revamp of the company's PVC operations, and the $167 million expansion of its adhesives operations in Australia. He was a strong advocate for the future of Australian manufacturing.

When he took the reins at a difficult time in 2001, Malcolm Broomhead, the first miner to run the company, also took investment fundamentals to the shop floor so that everyone understood the meaning of return on assets, how benchmarks were the key to future growth plans, and what was needed to get head office backing.

In 2010 chief executive Graeme Liebelt demerged Dulux, liberating what had long been an odd fellow in the company. It was also during Liebelt's time that Orica floated its fertiliser division, Incitec Pivot, leaving it as a specialist mining services company.

More recently, in 2014, under Ian Smith, once again the company returned to its core, selling its non-mining chemicals division to Blackstone.

Today, the company, led by CEO Sanjeev Gandhi and chair Malcolm Broomhead, is poised to move 'beyond blasting', putting a greater emphasis on mining technology products and extending the company's reach into 'future-facing' commodities such as copper, lithium and cobalt. Changing market conditions in the future will no doubt produce challenges, as they have in the past, but as Gandhi told the 2023 AGM, the company is 'well-positioned to navigate' those challenges 'with the strengths of our global network and culture, and a strengthened balance sheet. Our customers' appetite for new technology and our refreshed strategy sets us on a clear pathway to drive growth from blasting technology and accelerate the adoption of our digital solutions from mine to mill, growing beyond blasting.'


5

1 | ICI's forerunners in Australia

By the 1870s the Australian colonies were flourishing. Their economies were expanding rapidly after a severe depression in the wool trade and a halt to speculation in mining. The Overland Telegraph line between Adelaide and Darwin was completed in 1872, linking Australia to Europe, and the new railways were pushing inland from the ports.

The population passed the first million at the height of the Victorian gold rushes in 1858 and was fast approaching the second. The leading industries were gold and wool, and miners and drovers were busy extending the frontier far inland. The goldfields at Charters Towers and the Palmer River had just been discovered in North Queensland and, at the southern end of the continent, the world's richest tin mine was found at Mount Bischoff, in the forests of Tasmania. Diggers were even rushing to the grasslands near Darwin, although the mining industry mainly hugged the coastal fringe of the eastern part of the continent.

Explosives were key to expanding the Australian mining industry. Gunpowder was the explosive used, but that would soon change. In 1862 Swedish chemist Alfred Nobel had begun to manufacture nitroglycerine in a small workshop near Stockholm, the world's first modern explosives factory. Ten times as powerful as gunpowder, nitroglycerine was also much more unstable. In 1864 the factory blew up, killing his youngest brother and four staff.

Nobel's first attempt to make nitroglycerine less dangerous was to find a safe method of firing the charge. He filled a glass tube with black powder (mercury fulminate), which was then placed in the nitroglycerine. The detonator was patented in 1863 as 'Nobel's Lighter'. Being a liquid, nitroglycerine was so sensitive to friction that extreme heat and cold could cause it to explode in the holds of ships or the vans of railways. Clearly the liquid would have to become a solid.

Nobel turned to kieselguhr, a snowy, porous earth composed of particles of silica, which could absorb the nitroglycerine, creating a pink paste, which was more easily transported. This new explosive was granted the trademark 'dynamite' in 1867.

Previous spread: Storage hut located in the eastern goldfields, Australia.
Right: Storage and transport stations along the eastern goldfields, Australia.


WILLIAMSTOWN

Early tools of the trade: Wooden transport trolley used for sifted black powder.

At the age of 36 Alfred Nobel had mastered the main problems of his explosive and by the age of 40 he held shares in factories making dynamite in the United States of America, Germany and eleven other places. In the United Kingdom, the company was first called the British Dynamite Company but later became Nobel Industries.

In the 1870s the nature of mining in Australia was changing. The gold digger working with pick and shovel was giving way to companies using more efficient techniques to mine auriferous quartz and base metals.

Most mines were now located in hard ground and the powerful dynamite was the perfect fit. The Australian colonies obtained their first dynamite supplies, in small quantities, from the Nobel factories in Germany and Scotland. But Nobel had a more energetic competitor: the German Friedrich Krebs devised his own explosive, either infringing or improving on Nobel's dynamite patent. What Krebs called 'lithofracteur' was in essence Nobel's mixture of nitroglycerine and kieselguhr with the addition of powdered charcoal, sawdust, saltpetre, sulphur and other chemicals. This was exported to Australia from Hamburg.

Years of litigation followed, with Nobel accusing Krebs of infringing his patent. In 1879 Krebs lost the case in the British House of Lords, but by then he had already landed in Australia unchallenged, undercut the competitors' prices and boasted the product was free of gases and safe to carry.

Krebs' agent was London-based Jones Scott, whose partner in Melbourne was Robert Steel Scott. Scott's partner, Thomas Tolley Jones, negotiated with Krebs to manufacture lithofracteur in Australia behind the Melbourne tariff wall.

The Australian Lithofracteur Company, Krebs Patent, Ltd, registered in 1875, was a significant step forward in the emergence of the Australian chemical industry. In time,

Early tools of the trade: Wooden shovel reinforced with metal used for sifted black powder.

the Krebs factory became Nobel's and Nobel's became ICI. The selection of Melbourne as the site of the Krebs factory virtually dictated that the city would become the centre of ICI's activities in Australia.

For the new venture, Robert Steel Scott chose 70 acres (28 hectares) of cheap farmland 10 miles (16 kilometres) west of the city. A stony creek cut through the land, so the waterholes were always full. There was no town within miles to be wrecked by any accident and it was only one mile from the Bendigo railway line. For years Bendigo would house the largest buyers of the firm's explosives.

The company called the place Kororoit Creek, or Braybrook. It was not until later that a hunting club bred deer and kennelled hounds in the area, which led to a name change: Deer Park.

Construction began, workmen erecting a dozen huts and sheds at carefully measured distances. As protection against explosions, mounds of earth were thrown up 10 to 12 feet high around the most important buildings. Tramlines were laid so trolleys could be pushed carrying the explosive mixture.

The company installed boilers and steam engines and filled storehouses with pots of glycerine from the local candle works, nitrate of soda from Chile and powdered sulphur from Sicily. The rare kieselguhr was quarried near Amherst and railed to the factory, where it was mixed by hand with nitroglycerine in glazed bowls. The final process took place in the cartridge huts, where female workers pushed the paste through a sausage machine, then wrapped and packed the finished product.

The company opened for business on 27 September 1875. Despite teething problems—mining companies at first deemed the product unsafe—within six months the

Back in Ardeer, Alfred Nobel was working on a new explosive: gelignite. Dynamite had two main drawbacks: its high proportion of inactive material reduced the explosive potential, and nitroglycerine had a tendency to exude from the cartridge when dampened or compressed.

problems were ironed out and orders started rolling in. The Bendigo train halted twice weekly to hitch on the 'gunpowder van'.

The operation at Deer Park clearly involved potentially dangerous processes, but in stark contrast to the Nobel explosives factory at Ardeer, near Glasgow, Scotland, where every operation was regulated or supervised, the Deer Park factory had little government oversight. James Cosmo Newbery, the Victorian Government chemist, warned that the proximity of Deer Park and some backyard gunpowder factories to the city meant 'half of Melbourne was liable to be blown up' if an accident happened.

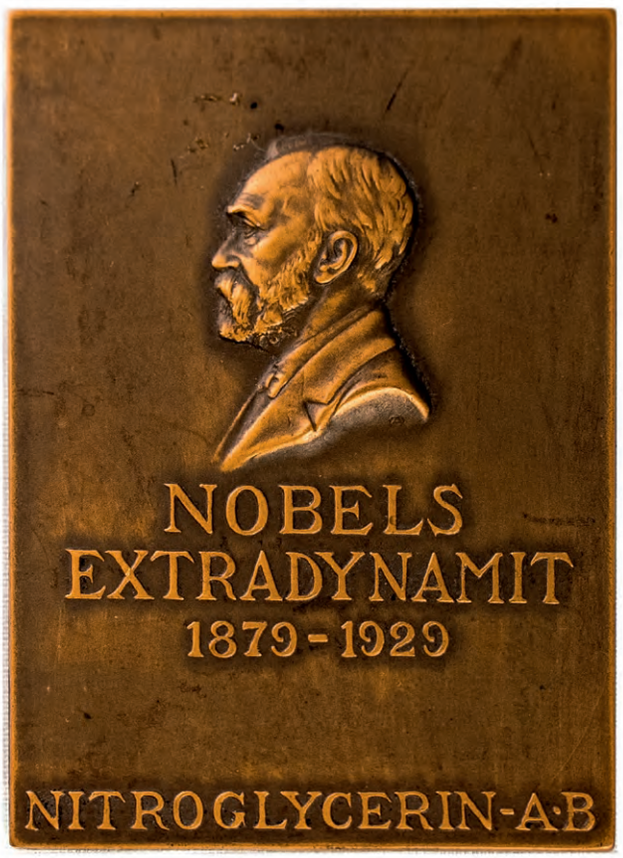
In response, in November 1877 Major WC Smith, the Minister of Mines, pushed through legislation to amend manufacturing laws. He noted that unless factories were inspected 'there was considerable likelihood of a large amount of property being destroyed'. The law gave the new Inspector of Explosives the power to inspect Victorian factories, but he could not condemn dangerous explosives imported from England or Germany.

Back in Ardeer, Alfred Nobel was working on a new explosive: gelignite. Dynamite had two main drawbacks: its high proportion of inactive material reduced the explosive potential, and nitroglycerine had a tendency to exude from the cartridge when dampened or compressed. Nobel's solution was to mix nitroglycerine with collodion cotton to produce a stable mixture with more explosive power than dynamite. Nobel patented the blasting gelatine in 1875 and soon his factories in Europe were making it. But problems with the early batches prompted Inspector Newbery to ban imports into Victoria of any explosive other than gunpowder after 31 October 1882.

The move gave the Australian Lithofracteur Company a valuable respite from fierce competition. Inspector Newbery maintained his strong campaign against imports from Nobel in Ardeer.

Even so, the factory at Deer Park seemingly did not gain its share of the growing explosives market in the 1880s and could not manufacture on a scale that ensured cheap costs of production. Furthermore, Deer Park manufactured only dynamite or lithofracteur, not the new gelatinous explosives, and could not make gelignite and

Nobels extradynamite cartridges in different sizes.



blasting gelatine until the Nobel patents expired in 1890. It was thus blocked from the expanding explosives trade.

The Australian Lithofracteur Company's products carried the label 'Safe and Sure', but danger was also unavoidable in the early explosives factories. Deer Park, where up to 50 workers were always at work handling the dangerous nitroglycerine, ranked as one of the most dangerous. Five men were killed at the factory in its first 25 years, one when he struck his mallet on a lead tank in which nitroglycerine had been washed; another was blown to pieces on the second building on that site; and three died when pebble powder exploded in a cartridge machine.

The triumph of blasting gelatine and gelignite was swift and ten years after landing in Victoria they were being used more than all the other powders combined. The company, which changed its name to the Australian Explosives and Chemical Company in 1888, stopped making powders in 1892.

The Australian economy had grown greatly in the 1880s, and Melbourne and Sydney were emerging as major cities. The burgeoning urban population spurred railway expansion and suburban growth, and ornate buildings faced with quarried stone expressed the cities' new wealth. Meanwhile, in regional areas new mining ventures were major consumers of explosives.

In Europe, rival producers ate into Nobel's market share by making slightly modified products and ignoring trade agreements. To counter this, in 1886, Nobel created a trust to hold the shares and guide the policies of a number of the Nobel factories. The Nobel Dynamite Trust Company, based in London, controlled Ardeer, four Nobel companies in Germany, and their subsidiaries in South America and Wales. The Latin Trust, formed a year later, controlled the Italian, Swiss, Spanish and French companies.

In 1887, Nobel patented ballistite, a military explosive produced by kneading equal parts of nitroglycerine and soluble nitrocellulose. Ballisite had a slow burning rate and was intended to replace gunpowder as a smokeless, high-velocity propellant for bullets and artillery shells. Two years later, two British chemists patented cordite, a modified form of ballistite (the patent was unsuccessfully challenged by Nobel). Cordite quickly became sought after by the world's military powers.

Around this time, the Australian colonies had become concerned about the defence of their sparsely populated continent. *The Times* on 25 March 1896 noted that a conference of Australian premiers decided a cordite factory should be established in Australia. Thomas Johnston, a Nobel's Explosives Company general manager, saw the article and wrote to the colonies explaining, 'outside the British Government itself, we are the only producers in the world of all the ingredients that go to make Cordite'.

He offered to spend £60,000 on a small cordite factory in Australia if the six colonies would subsidise him and grant a monopoly to make all Australia's nitroglycerine explosives, both commercial and military. The offer was not accepted, but Victoria pressed ahead with its own investigations, sending its explosives expert, Cecil Napier Hake, to London.

Nobel became impatient and made an offer of £100,000 to the Australian Explosives and Chemical Company to buy Deer Park. This was an offer that couldn't be rejected: the factory was profitable but the future less secure, and high costs of production and sea freight meant expansion beyond the eastern seaboard was problematic.

The company needed government backing for cordite manufacture to commence, but none was immediately forthcoming. In January 1900, with the Boer War into its third month, the British War Office told Australia it could not supply it with cordite ammunition.

Negotiations were swiftly sealed, and by the time Hake arrived back in Australia in January 1897, he learned the Nobel Dynamite Trust had bought the Deer Park works.

The company needed government backing for cordite manufacture to commence, but none was immediately forthcoming. In January 1900, with the Boer War into its third month, the British War Office told Australia it could not supply it with cordite ammunition. Victoria's Premier sent telegrams around the country suggesting united action to sponsor cordite manufacturing at Deer Park.

New South Wales turned its back on the request, instead opening its own negotiations with Thomas Johnston, the general manager of the Ardeer factory, asking him to build a small cordite factory in New South Wales. In July 1900, the Victorian Government informed Deer Park's general manager, Thomas Tolley Jones, that it would buy the cordite for half a pound, barely matching the British price, and order just 12,000 pounds, an amount so small Ardeer could make it in half a day, all of which meant that the Victorian factory would lose heavily if it made cordite on such a small scale at such a low price.

Nobel's attempt to tie up both Melbourne and Sydney failed and in 1901 the colonies decided to give the newly inaugurated Commonwealth Government sole power on where the factory should be built. On 22 July 1901 Prime Minister Edmund Barton and his entourage emerged from Parliament House in Melbourne to visit Deer Park. On the visit he made clear the day must come for the government to make cordite or buy it from an Australian factory.

In 1909 a British chemist, AE Leighton, arrived from India to erect the government's own cordite factory in the Melbourne suburb of Maribyrnong. Nobel's realised their bold coup in 1896 had failed.

The Nobel Dynamite Trust had a profitless factory on its hands. The purchase price was excessive and manufacturing costs were high: it cost 65 per cent more to make a ton of explosives at Deer Park than Ardeer. Import tariffs were also declining.

The plant was kept alive with little enthusiasm and even when it repacked Nobel explosives that had exuded glycerine and created a small export trade in rack-a-rock explosive to mines in China and Malaya, its output rarely exceeded 100 tons a year.

The factory diversified into chemicals, selling surplus acids to Melbourne works that extracted gold from wayward pyrites from distant goldfields. Sprays were sold

By 1906 and 1907, Australian gold production was booming and the explosives trade was buoyant.

to orchards infested with black spot and codling moth. The sulphuric acid plant was enlarged, and acid not used for explosives was mixed to produce superphosphate for the country's wheatfields, as farmers fought the exhaustion of their soil. The artificial fertiliser trade was prospering, although the plant's 'Federal Brand' lagged behind the sales of Melbourne rivals Mount Lyell and Cuming Smith.

By 1906 and 1907, Australian gold production was booming and the explosives trade was buoyant. The Nobel Dynamite Trust dominated trade, but in Europe and Australia it was not satisfied with its profits and in September 1907 it united with other European manufacturers to form the High Explosives Trade Association. Its aim was to fix prices and allot market quotas. Nobel controlled five of the seven Association members, the two exceptions being Kynoch and Curtis's & Harvey.

This created a virtual monopoly in Australia, and the Association quickly tried to exploit this status by announcing a 45 per cent price hike. This move shocked and angered customers who at the time were also coping with falling metal prices. Gelignite was one of the heaviest expenses and smaller mines could not afford the price increase.

One of these smaller companies was Lloyd Copper at Burraga in New South Wales, which was run by a feisty mining engineer, WH Corbould, known in the mining camps as Jimmy the Bastard. Twenty years later he would develop the Mount Isa field using the same determination he now threw at the explosives ring. He gathered in support members of the Victorian and West Australian chambers of mines, Mount Morgan, Mount Lyell, three Broken Hill companies (including BHP) and the Great Cobar and Nymagee copper mines in New South Wales.

The defence committee was chaired by FM Dickenson with the backing of BHP. As there was no other explosives supplier in Australia, the committee turned to South African mining company De Beers. De Beers answered the call, promising to fill half the market with five-year contracts with the independent miners to sell £1.2 million of explosives a year.

Word of the plans spread to London, where the High Explosives Trade Association cabled its Australian salespeople telling them to offer cut-price deals and for the first time with five-year contracts to match those of De Beers. Nobel's counterattack worked in part, with Western Australia falling into line, but the Broken Hill companies stood firm. In 1908 they signed a contract with De Beers. Their annual purchases of £600,000 of explosives were enough to force Nobel's to offer even better prices to other mines.

The Nobel-run Association continued to supply most of the market, but De Beers was ready for a fight. It asked the Inter-State Commission, which was responsible for adjudicating matters related to interstate trade, to abolish the 5 per cent duty which

Cartridge house workers in safety tunics and shoes sitting on the outside wall at Deer Park, Australia, 1920s.

it paid on imports. De Beers argued that Deer Park, which made only 3 per cent of the explosives used in Australia, was a sham facade for Nobel (local production was necessary to justify a protective import tariff).

De Beers ran the largest explosives works in the world, sailed its own steamer to Australia, charged its consumers 6 per cent above factory cost, yet still battled to match the association's (Nobel) prices. This was a telling argument. In 1916 the Inter-State Commission denounced Deer Park, and De Beers suggested Deer Park was being used as a sham to pretend there was an Australian industry. It warned of the impending danger if Nobel was left to monopolise the Australian market and recommended the tariff duty be abolished.

De Beers continued to trade in Australia, but not for long. By 1924, it had retired from the Australian market after joining forces with Nobel in South Africa. Nobel had won its hard-fought monopoly in Australia but in the process had learned the dangers and duties of a monopoly.

Generous long-term contracts were signed with the Australian mines. Fear of competition bred an enlightened monopoly.

Gyttorp, Sweden

Powder packs and cartridges for sport shooting.

The Orica factory at Gyttorp, on the shores of Lake Vikern in southern Sweden, has links with Alfred Nobel, the father of modern explosives. The town's industrial history dates to the 17th century, when cannonballs, cannons and grenades were manufactured there for the Swedish state. An explosives factory was constructed in Gyttorp in 1858 to make gunpowder, and later nitroglycerine and dynamite. The explosives were mainly used for blasting in mines. In 1915 the factory's owner, Gyttorps Sprängämnes AB, was acquired by Nitroglycerin AB, which had been founded by Nobel in 1864. Nitroglycerin AB later changed its name to Nitro Nobel, and in the 1980s became part of Dyno Nobel.

After World War II the company commissioned the British architect Ralph Erskine to plan an area of new housing in Gyttorp. The resulting apartment buildings, business premises and a school, built between 1948 and 1961, gave the town a very modern look. The once more diversified and dominating factory in 1980 had 1600 employees; it now employs around 300 people.

Production centres on research into detonation systems and their manufacture. In the 1960s under the leadership of Per-Anders Persson, the company developed the Nonel (non-electric) brand, which was launched to the demolitions market in 1973. Instead of electric wires, Nonel used a hollow plastic tube to deliver the firing impulse to the detonator, making it immune to most of the hazards associated with stray electric current.

In August 2000 private fund Industri Kapital acquired Dyno Nobel, Gyttorp's owner, from the Oslo Stock Exchange for US$1.2 billion and sold the non-explosives parts of the company. In May 2003 Dyno merged with the US-based Ensign-Bickford company. In May 2004 Dyno Nobel Canada was created by combining Western Explosives with Dyno Nobel and Dyno Nobel Titan.

In September 2005 a consortium of Orica and Macquarie Bank acquired Dyno for $2.2 billion and sold the non-US and Australian assets—including the Gyttorp operations—to Orica for $900 million.

Entry to Orica Gyttorp site. Signage features a Kollergång, old machinery used to crush charcoal and mix with sulphur and saltpetre to produce black powder.

2 | ICI comes into being

The Nobel Trust, with its mixture of British and German interests, was an early casualty of World War I. The Trust was dissolved in 1915. Nobel's Glasgow-based company retained the British interests, including the works at Deer Park. The war saw huge quantities of explosives supplied by Nobel and other British companies. Peace, by contrast, meant uncertain times for the Trust's British companies. Knowing they could be crippled or insolvent, in November 1918 they created a holding company called Explosives Trades Limited.

The new Nobel consisted of 17 independent companies and 93 factories in Britain, Canada, South Africa and Australia. Sir Harry McGowan from Nobel in Glasgow was the first chair. Renamed Nobel Industries in 1920, the company occupied the old office in Glasgow as its first head office before moving to London, to the former Buckingham Palace Hotel.

The five largest companies in the merger had all been active in Australia, but Nobel at Deer Park was by far the strongest, having grown quickly when the war threatened a submarine blockade of the country. The output from Deer Park had grown by a factor of 15 times and by the end of the war it employed 250 people. It was now by no means a token factory.

A second member of the consortium was Bickford Smith, which manufactured in Australia a decade before Nobel from its base in Spotswood, after its founder William Bickford invented the safety fuse. This was a length of yarn filled with black powder that burned while the miners hurried to safety.

A third member was Kynoch Limited, which started in Birmingham in 1851 making percussion caps before branching into Enfield rifle cartridges. Founder George Kynoch was succeeded by Arthur Chamberlain, the brother of the politician Joseph. It established an ammunition factory in Melbourne in 1913.

In 1920 one of the new company's senior men, Benjamin Todhunter, visited Australia and concluded that the wisest step was to delegate broad powers of supervision to an independent Australian firm. He gave the company's power of attorney to Elder Smith and Company, one of Australia's strongest companies and for decades

Previous spread: The wood yard and kilns for the production of charcoal used in the manufacture of black powder at Deer Park, Australia.

The wood yard and kilns for the production of charcoal used in the manufacture of black powder at Deer Park, Australia.

agents for Nobel Explosives. Elder Smith was Adelaide based, but its busy Melbourne branch was managed by Sir Lennon Raws.

Ownership of the new company was split according to assets contributed, with Nobel Explosives controlling 42 per cent, Australian Explosives 30 per cent, Curtis & Harvey 12 per cent and the remaining 16 per cent split among the three smaller companies. It was governed by a board of five Australians responsible to London, but it had power to do its own thing within the sales territory of Australia, New Zealand and British New Guinea. New products could be made with London's consent, or products could be imported from London at fair prices. The new directors, including Todhunter from London and Raws, had their first meeting on 16 July 1925 with other members of the group.

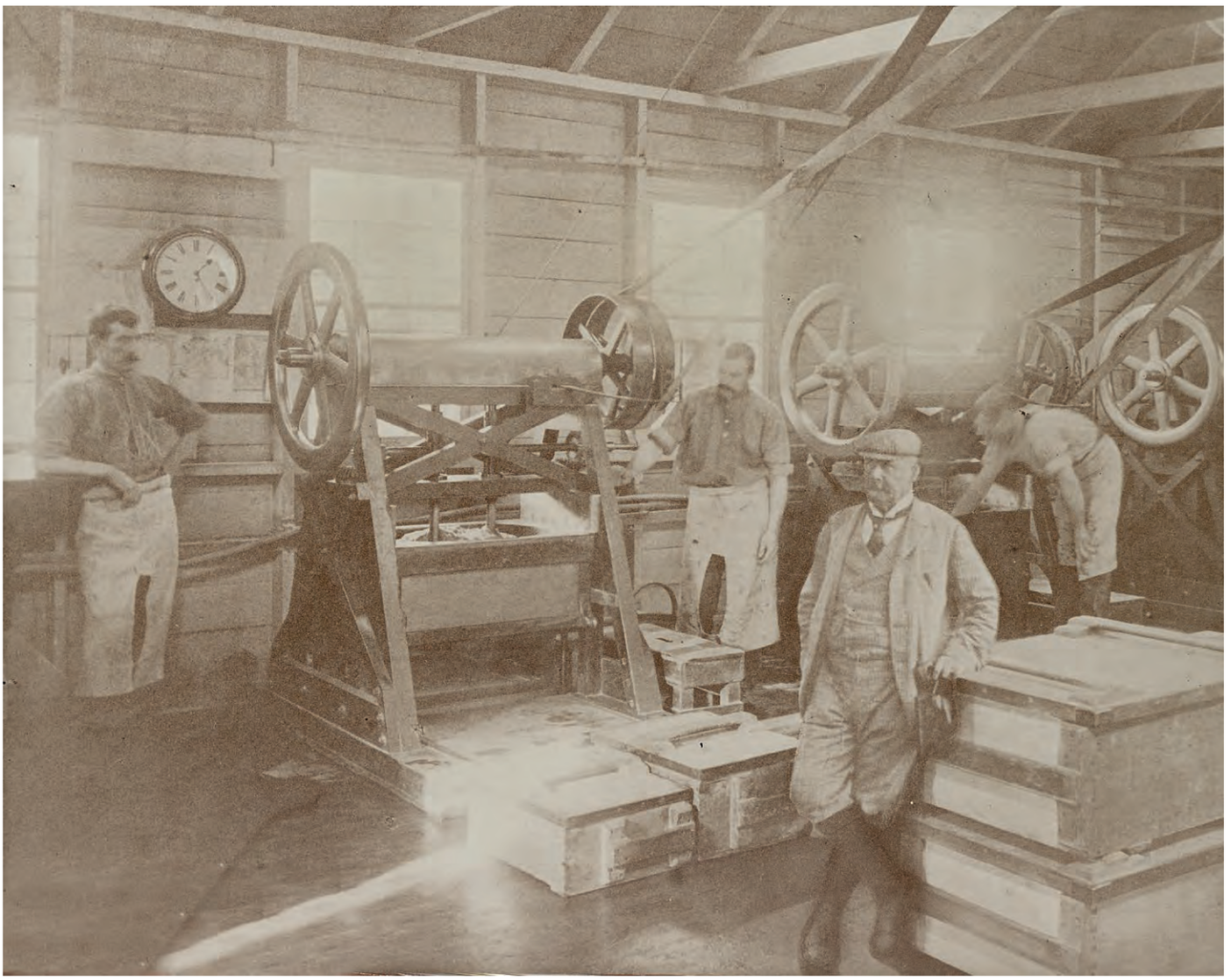
Turnover for the year was estimated at £527,000 imported and £389,000 of locally made explosives. New South Wales would be the biggest market thanks to its coalmines, and BHP and Elder Smith would handle the sales.

Just as things were settled in Australia, on 17 December 1926 a cable from London delivered the news that Nobel Industries was now part of a larger company, Imperial Chemical Industries (ICI). The merger, at the time the largest in British commercial history, was driven by Sir Harry McGowan and Sir Alfred Mond. McGowan, a 52-year-old cigar-smoking Scot, had joined Nobel at the age of 15 and risen through the ranks. Mond was six years older and had inherited his wealth from his German father's chemical firm, Brunner Mond and Company. He saw himself as a statesman and industrialist.

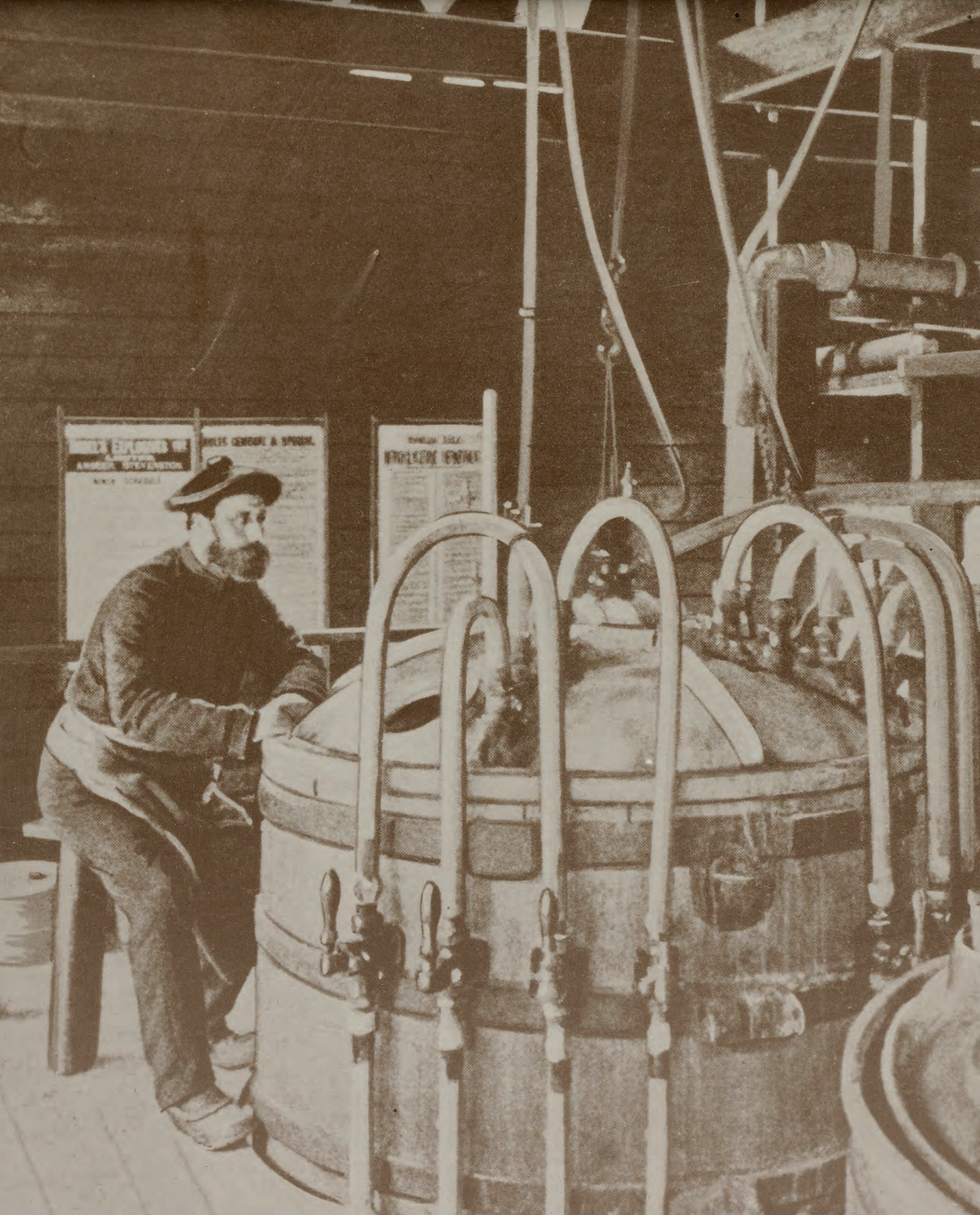
The two plotted the merger on a return steamer trip from the US in 1926 with the plan to take on the great chemical combines in the US and Germany. Mond confided, 'my ideal is to see our great organisation controlling the production and sales of chemical manufacturing within the empire'. McGowan concurred, saying, 'we are not merely a body of people carrying on industry in order to make dividends, we are much more. We are the object of universal envy, admiration and criticism and the capacity of British industrialists, British commercialists and British technicians will be judged by the entire world from the success we make of this merger.'

The combined company merged Nobel Industries with Brunner Mond, the United Alkali Company and British Dyestuffs Corporation. The merger was finalised in late 1926 but not before a dispute with the regulators over the use of the word 'Imperial'. McGowan argued the company would trade throughout the Empire and develop patents of high importance to the Empire. In a letter to the Board of Trade he argued that, 'the new company is unique in the annals of British industry and commerce' and, further, given its importance for Imperial defence and development, it was surely more entitled to use of the name than such as 'Imperial Tobacco Co'.

Eventually, the Home Office consented. On the first day of 1927, with capital of £65 million, the new company, the hope for the future of the British chemical industry, began.



Management at Deer Park, Australia, supervise the mixing in the dope house. Wooden containers used to transport the mix.



3 | An Australian ICI takes shape

One of ICI's directors, Benjamin Todhunter, was an energetic, brusque New Zealander who had long lived in Britain. He was perceptive, with an ability to make sweeping plans and, as one colleague remarked, 'he has one quality not common in ICI—that of grasping the nettle firmly and doing something about it'. From his days with Nobel he had looked after Australia and was knowledgeable about its politics and prospects. He knew the three main political parties wanted strong manufacturing industries and were willing to pay for them. He also knew ICI could not hope to retain markets by simple exporting and if the company did not manufacture new chemicals, other groups would step in to displace them. This fear of competitors would drive ICI's Australian policies for a generation.

Todhunter's plans for Australia were based around nitrogen, which was used in agriculture as a component of fertilisers. ICI had wanted to control the nitrogen industry throughout the Empire, and Australia, with its vast sheep lands and wheatfields, seemed particularly well suited. The trick was to prick demand and make nitrogen cheaply in Australia. Australia's explosives industry could use that same nitrogen in the production of nitroglycerine.

ICI had inherited an explosives monopoly from Nobel, and in 1927 it seemed many branches of the chemical industry could use nitrogen. Just before World War I, the Germans had established an economical method of making nitrogen by mixing air with hydrogen at high temperature, forming a synthetic ammonia that contained one part nitrogen and three of hydrogen. The first Haber-Bosch plant operated in Germany in 1913 and when the war cut off imports of Chile's natural nitrates, Germany had a process to supply synthetic ammonia for its explosives and fertiliser needs.

The Germans kept the process secret, but in Britain, Brunner Mond worked out the method and its plant in Billingham became a giant in the local chemical industry. The new directors of ICI saw it as a means to boost its plans to build a global industry.

Australia had previously taken industrial nitrogen from Chilean nitrates or the ammonia by-product of gasworks or coke ovens. ICI figured if it was to make synthetic ammonia it could compete with these sources, but knowing it could not eliminate them, it also had to cooperate.

Previous spread: Explosives: The early years. A constant watch on the temperature during the production of nitroglycerine at Deer Park, Australia.

Horse-drawn transport was used in the early years at Deer Park, Australia, to take explosives from the factory magazine to the main loading point.

Wallaroo-Mount Lyell Fertilisers Limited, South Australia, c. 1920.

In 1927 it was offered a controlling interest in two ammonia companies that were descendants of US companies. They were National Ammonia and the Ammonia Company of Australia, which made its first waterless, or anhydrous, ammonia in Clyde, in western Sydney, in 1898. When refrigeration came into vogue, anhydrous ammonia was in demand and the new company took an 80 per cent stake in Victoria Ammonia, which built a plant in Spotswood, Melbourne, in 1912. This plant not only supplied local iceworks and meatworks but exported its product to destinations ranging from Vladivostok to Bombay.

The US chemical company DuPont emerged as the new controller of National Ammonia. While synthetic ammonia was taking hold in Europe, the Australian market was protected by tariff duties.

But an increasing amount of ammonia was being turned into sulphate of ammonia, a fertiliser that DuPont did not market in Australia. With the market now changing, in 1927 DuPont offered its Australian ammonia interests to ICI, which duly accepted. ICI believed in the future of nitrogen in Australia, and control of anhydrous ammonia was one step in the journey. But the company faced a challenge in selling nitrogen-based fertiliser in Australia. Traditionally, phosphate-based rather than nitrogen-based fertilisers were the biggest sellers. This was because the soils of southern Australia were short of phosphates and, when spread, the phosphate-based fertilisers yielded lush crops, so farmers saw no reason to change. Superphosphate dominated all but a few pockets, such as the subtropical North Queensland sugar cane farmers, who got nitrates from either Chile or the Newcastle steelworks' coke ovens.

ICI had one foot in the other camp. Deer Park, for a quarter of a century, used surplus sulphuric acid to make superphosphate in a small plant and was also a member of the Victorian Fertiliser Association. ICI had also acquired from Mount Morgan Gold one third of the share in Australian Fertilisers Limited, which had a large factory in Port Kembla, New South Wales.

In 1928 the company acquired shipowner Howard Smith's 22 per cent stake in South Australia's largest fertiliser company, Wallaroo-Mount Lyell Fertilisers, which meant it now had a stake in fertiliser companies in four of the five mainland states. But its hold was tenuous and the political environment uncertain, leaving wide open the chance a competitor could move in.

On Todhunter's urgings, ICI assembled a high-level review of the position. While the company considered options, there was also an alternative that just maybe Australia was not keen to turn to nitrogen and was yet to be convinced about the push into intensive farming, which was considered to make nitrogen more appealing.

In June 1928 ICI decided to erect a plant capable of producing 150,000 tons of sulphate of ammonia a year, averaging 20 per cent nitrogen. Just whether there was demand to meet that supply was another question altogether. ICI looked for partners with an eye to their potential as competitors and also those who might fight the synthetic ammonia scheme.

The most obvious was BHP. Australia's richest company, it was a prolific producer of silver and lead and, with its Newcastle steelworks, already produced sulphate of ammonia from its coke ovens. Then there was the Barrier group of companies,

including Broken Hill South, North Broken Hill, Zinc Corporation and Broken Hill Associated Smelters, which mined and smelted ores around Broken Hill. Their interests also included paints, metal fabricating and fertilisers. Barrier's Melbourne chiefs, including WL Baillieu and WS Robinson, were powerful businessmen.

Another was Mount Lyell Mining, formed in 1893 to build an alpine railway and mine copper ore in Tasmania. By the end of World War I, it had moved into the heavy chemical industry and as such was a competitor to ICI. Its chair, George Swinburne, was a politician and engineer. The fourth company approached was Cuming Smith, which shared Mount Lyell's leadership in fertilisers and was also a near neighbour. An efficiently run company, it saw little reason to amalgamate with ICI.

ICI directors quickly saw the chance to dominate all branches of the heavy chemical industry with an amalgamation and decided to invite two or more of the groups to merge their fertiliser and chemical interests into a common company, to which ICI would add its explosives trade, import chemical business and ammonia works. As nitrogen seemed the most promising industry for a rural nation, ICI realised it was in a weak position and was willing to take a minority stake. Benjamin Todhunter arrived from London in September 1928 ready to negotiate. The local ICI directors, including Sir Lennon Raws, met him in Perth to protest the plan to surrender all of ICI's interests in Australia to the fertiliser companies.

Todhunter listened but was not persuaded. When he arrived in Melbourne the first port of call was the Mount Lyell company, which had recently lost its chair, George Swinburne, and was now headed by an elderly accountant, Colin Templeton. One of his concerns was why ICI had made the momentous decision to make nitrogen synthetically on such hazy estimates.

Mount Lyell's reluctance did not help Todhunter's mood when on his first break the following Sunday he broke his right foot horseriding. When Mount Lyell and Cuming Smith retreated and accepted, Todhunter said no.

This was a crucial retreat. The future of the Australian chemical industry lay in explosives and alkalis, not fertilisers, and for ICI the future was stronger under its own control rather than through a company controlled by the fertiliser interests. Two companies emerged instead of one, with the larger companies creating Commonwealth Fertilisers and Chemicals, and ICI Australia and New Zealand (ICIANZ) the other.

Commonwealth Fertilisers was the largest chemical company in Australia, but ICI's share was just 4 per cent. The Deer Park superphosphate works were old and small, and they closed in July 1929.

Mount Lyell and Cuming Smith soon learned their 85 per cent share in Commonwealth Fertilisers was worth little compared to what might have been under Todhunter's original plan. Commonwealth Fertilisers was tied to a stagnant part of the economy and its only outlet was the growing demand for caustic soda, chlorine, weedkillers and a collection of other agricultural chemicals.

Explosives: The early years at Deer Park, Australia. The packing house for finished products destined for markets of the world.

ICI was fortunate to escape from a heavy investment in superphosphate and even more to avoid nitrogenous fertilisers. Todhunter's vision had failed. Had it succeeded, ICI would have sold its Australian interests for a small share of the nitrogen market. Instead, it had an Australian subsidiary that was to develop under the parent company's control.

Imperial Chemical Industries (Australasia) came into being in 1928. It employed less than 500 people, and its annual profit did not pass £150 000 until the fifth year. The company did not even have its own building. Its first managing director was Sir Lennon Raws.

The board of the new company first met in Melbourne on 8 March 1929, and one of its first resolutions was to change the company name to Imperial Chemical Industries of Australia and New Zealand (ICIANZ).

4 | Deer Park evolves

As described in the previous chapters, Deer Park, on the plains to the west of Melbourne, was the industry pivot of ICI's three ancestral companies, Nobel, Australian Explosives (Krebs) and Jones Scott and Company, which in 1874 purchased a 70-acre farm as a site to make lithofracteur explosives. Many of the original farmhouses were there through World War I when the factory was expanded to meet demand. Long-time manager Charles Tilburn ran the site until ICIANZ replaced him with an experienced explosives engineer, Norman Taylor.

Taylor, who graduated in science from the University of Manchester, joined Nobel's at Ardeer in 1911. He gained a reputation for revitalising rundown explosives works, in Wales first, then the Rand of South Africa, which at the time made half the Empire's explosives.

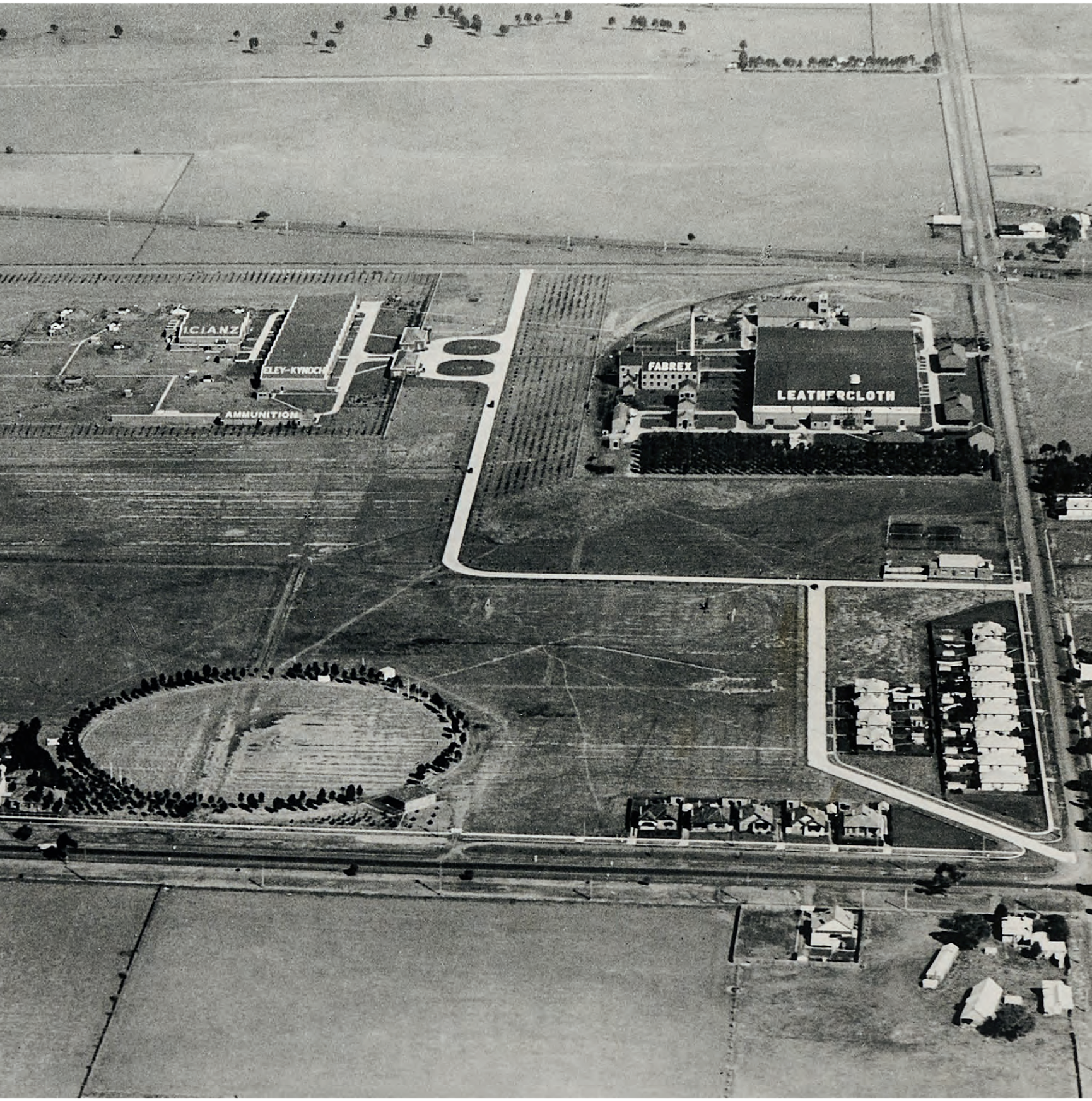
Taylor arrived in Australia in 1928, inspected the obsolete plant at Deer Park and started at the end of his first week in the country, becoming the technical leader of the site. Having a manager with experience remedied one weakness in the explosives plant. There were other problems, though, including transport: the company had to own ships to carry its dangerous products, but the trade was not large enough to justify a modern steamer.

A bigger worry was the future of the factory. The westward march of Melbourne's suburbs in the prosperous 1920s challenged the factory's essential isolation. A railway station named Ardeer was placed in the south-east corner of the explosives area surrounded by the noticeboards of subdividers and auctioneers. Once the factory was hemmed in by houses it might be too dangerous to continue the manufacture of explosives. More nitroglycerine was now stored and handled in the area, raising the risks. Safety precautions were enforced more strictly, but in 1931 the washhouse was hit by lightning and 5000 pounds of nitroglycerine blew up, damaging nearly every building in the area. In 1939, a smaller explosion killed three men, the third triple fatality in the factory's history.

The fear of an explosion haunted Benjamin Todhunter in the late 1920s, and he believed the expansion of Melbourne's suburbs would force the company to build a new

Previous spread: Explosives: The early years at Deer Park, Australia. Fulminate retorts in a sulphuric acid store.

Explosives: The early years. The searchers' hut at the entrance to a danger area and the team that would ensure no contraband entered.



ICI Deer Park, Australia, 1938/39, looking south.

In 1927 Nobel sold a record 5300 tons of explosives, of which 3300 tons were imported from Scotland. But in the following years as the Depression took hold, coalmines closed and engineering construction projects ceased.

factory elsewhere. Just where to build was the problem, as it had to be near a port, and all of Australia's big ports were in cities. The dilemma was solved by the Depression, which halted the advancing housing and the need for a new explosives works.

In 1927 Nobel sold a record 5300 tons of explosives, of which 3300 tons were imported from Scotland. But in the following years as the Depression took hold, coalmines closed and engineering construction projects ceased. Sales slumped to 3400 tons in 1931, forcing the factory to close one week in four.

Fortunately the revival of Western Australia's gold mines made that state Deer Park's biggest customer for explosives, and by 1933 sales had recovered to 4000 tons, of which one quarter went to Mt Isa Mines, BHP and two Western Australian companies, Lake View and Star and Wiluna Gold Mines. The following year the upsurge in mining throughout Australia had almost lifted sales to their pre-Depression peak.

Ardeer ceased to be Australasia's biggest source of explosives because the depreciation of the Australian pound in 1931 undermined the Scottish centre's advantage, with Australia now paying 25 per cent more for Australian gelignite. This meant it was cheaper to make the product in Deer Park and the economics of the industry had swung so dramatically that the goal of Australian self-sufficiency in explosives production was now a practical one.

In 1934 ICI London made clear that Australia should make whatever products were economically feasible, even if the parent company's own profits suffered. The market was tipped to hit 5300 tons and as Ardeer continued to supply smokeless powders and detonators, its quota was fixed at 500 tons to make up an economic cargo.

The investment of £15,000 on acid tanks, cartridge huts and other plant extensions meant Deer Park could make the other 4800 tons. This would save the Australian company £42,000 a year, part of which was returned to mines that bought explosives under cooperative contracts. Ardeer would be deprived of £17,000 of profit a year, even though this loss would nearly be compensated for by increased dividends from ICIANZ.

The explosives market continued to expand, setting new records, which meant Ardeer sent out more than its quota and another £120,000 was spent expanding Deer Park. By 1939, the plant could produce 7500 tons a year, having trebled in a decade to

In 1930 Essington Lewis of BHP was so impressed with the cheap explosives used in South American mines he investigated the cost of making black powder at the iron quarries of Iron Knob in South Australia.

feed mines from Maitland to Marble Bar. High output cut costs and ICIANZ was soon selling explosives at lower prices than the large works in England and North and South America. Todhunter reversed his opinions of Deer Park's longevity, and decided the danger of encroaching suburbs was more remote than he thought.

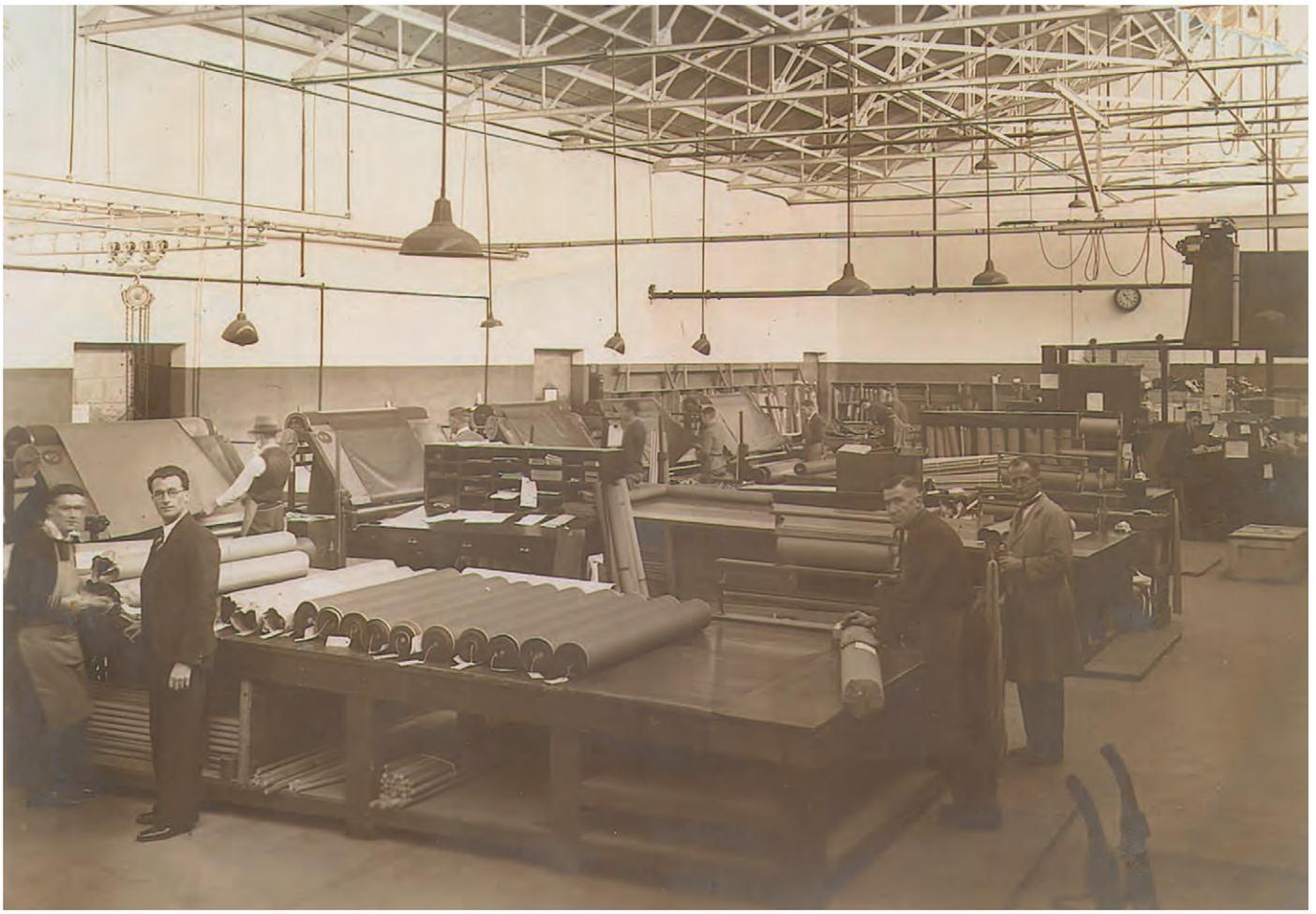
ICI's monopoly of the explosives trade had some intruders. In New South Wales, railways and public works used chlorate of potash, against which ICI competed with its old-fashioned rack-a-rock. The State Coal Mine at Wonthaggi in Victoria imported one consignment of detonators, but only one. Belgium had a brief sortie into the Australian market, and a US contingent arrived but few explosives followed.

Still, the large mines had enough initiative to make ICIANZ vigilant of its monopoly. Fear of competition led indirectly to the manufacture of black powder at Deer Park. The powder trade had withered since Bendigo had its grimy backyard works in the 1880s and Krebs kept its small plant for miners who shunned nitroglycerine.

In 1930 Essington Lewis of BHP was so impressed with the cheap explosives used in South American mines he investigated the cost of making black powder at the iron quarries of Iron Knob in South Australia. He consulted with ICIANZ, but the plan was rejected by ICI in London, which believed the loss of the Australian market for black powder would close its own factory at Faversham and argued the Australian factory was also hostage to moves in the export market.

When Faversham did close, in 1936, a small plant began making black powder at Deer Park and later extended its activities to make powder for safety fuses. In May 1936 the company was more disturbed when the powerful Nippon Explosives began quoting a price against Deer Park for its surplus stock. ICIANZ was shattered. Sir Lennon Raws immediately composed a statement noting his company served the market cheaply and efficiently, kept a three-month store of explosives, employed 334 people, was vital to defence and was protected with just a 5 per cent tariff. This statement was handed to the government with the message that unless the government acted quickly, Deer Park would be endangered.

The federal government decided to impose an embargo on explosives, fuses and detonators from all countries apart from the UK. This was more than ICIANZ could have hoped for and by chance it included a ban on nitrocotton, which hit US-based Hercules Powder, supplier of one quarter of the Australian market. Its expulsion gifted



Inspection and packing at the leathercloth factory, Deer Park, Australia, c. 1940s.

the entire market to ICI. The government told ICIANZ the ban would only remain if the company was willing to manufacture it in Australia, even against the parent company's concerns.

In February 1937 the ICIANZ board resolved to make nitrocotton at Deer Park. The government maintained its protection.

The plant began operating in 1939 and was designed to make 100 tons of soluble nitrocotton a year for explosives and 150 of dense nitrocellulose for leathercloth, and, two years later, nitrocotton was made for lacquers. In 1940, a factory on the site opened to make plain and electric detonators, making Deer Park self-contained in high explosives and their ancillaries. National defence needs had broken the dependence on Ardeer.

Since 1929 Deer Park had separately been making leathercloth (artificial leather), used in the hoods and upholstery of the new roadsters on Australia's roads. Leathercloth had a raw material in common with explosives: white fibrous nitrocellulose, produced by treating cotton fibre with nitric acid in the presence of sulphuric acid. A slightly smaller quantity of nitrogen was used for leathercloth than for explosives. The fabric was waterproof, tough and resistant to the grease and mildew that could damage true leather.

The link between explosives and lacquers was spliced more quickly by the American explosives manufacturer EI DuPont, which was founded in 1802 by an émigré French

Slide fastener packing room at the ammunition factory, Deer Park, Australia.

At Deer Park production diversity continued with a push into slide fasteners. In 1931, six years after the first Birmingham fasteners arrived in Australia, ICIANZ imported 100,000 feet and realised the market was expanding so quickly local manufacturing may be possible.

printer. Its Delaware factory rolled out kegs of gunpowder for nearly 80 years before switching to nitroglycerine explosives. The company later became a powerhouse in chemicals, dyestuffs, plastics and synthetic ammonia, but its first venture outside explosives was in nitrocellulose fabrics and lacquers. It had brilliant success with its new lacquer called duco, which was so versatile and smooth it transformed the exterior of motor vehicles.

The process was so indispensable that Nobel formed a new British company, Nobel Chemical Finishes, that incorporated its own paint, lacquer and DuPont's patents. In Australia, a rival emerged, Waterproofing Pty Ltd, and the threat of a competitor resulted in swift action from Sir Lennon Raws, who united with DuPont to make leathercloth in Australia. The Tariff Board backed the joint venture, thinking it would strengthen the explosives industry and foster the growing of cotton in Australia.

Edward Holden, Australia's largest vehicle assembler, urged ICI London to establish the plant in Adelaide, the home of the Australian car industry, but London doubted Adelaide would retain its grip on the industry and felt a Deer Park base would give the company more control.

A former Ardeer engineer named McGregor arrived in 1928 to supervise the new factory. On 18 July 1929 it opened in front of the Victorian Premier and US consul, but it was hit with a combination of technical problems and the Depression. The hope was a revival of the motor vehicle industry and, by the 1936 financial year, demand was in such good shape that DuPont and ICI transferred the business to ICIANZ.

The factory was built to incorporate a plant for duco but it was never completed as its output competed with paints already made in Australia. In 1928 the duco rights were sold to British Australian Lead Manufacturers (BALM), which was to become the dominant paint-maker in Australia (see chapter 9).

At Deer Park production diversity continued with a push into slide fasteners. In 1931, six years after the first Birmingham fasteners arrived in Australia, ICIANZ imported 100,000 feet and realised the market was expanding so quickly local manufacturing may be possible. Birmingham was controlled by the old explosives firm Kynoch, one of the original companies that combined to form Nobel Industries and again in 1926 to create ICI.

ICIANZ was not overly committed to the concept of making fasteners in Australia but, in part to settle a patent dispute with a rival, the Carr Fastener Company, it established a small workshop near the explosives works at Deer Park. The company assumed demand would continue and the locally produced fasteners would compete with imports. But the Depression hit and sales slumped from over 700,000 to 400,000 feet between 1933 and 1935.

After World War II demand increased, and in 1949 ICIANZ moved the factory from Deer Park to Ascot Vale to attract the women workers it would need. Australia's demand skyrocketed to over eight million feet, which was more than the Ascot Vale plant could meet.

Ammunition was another valuable trade that found its home in Deer Park. Shotgun cartridges were the most popular ammunition and ICIANZ assembled them near a disused quarry in West Footscray from 1913. The main local competitor was D&W Chandler, which loaded cartridges from components while also forging ties with another German powerhouse, IG Farben. In 1934 Sir Lennon Raws in London discussed plans to build a factory capable of making 18 million shotgun and 60 million rimfire cartridges a year.

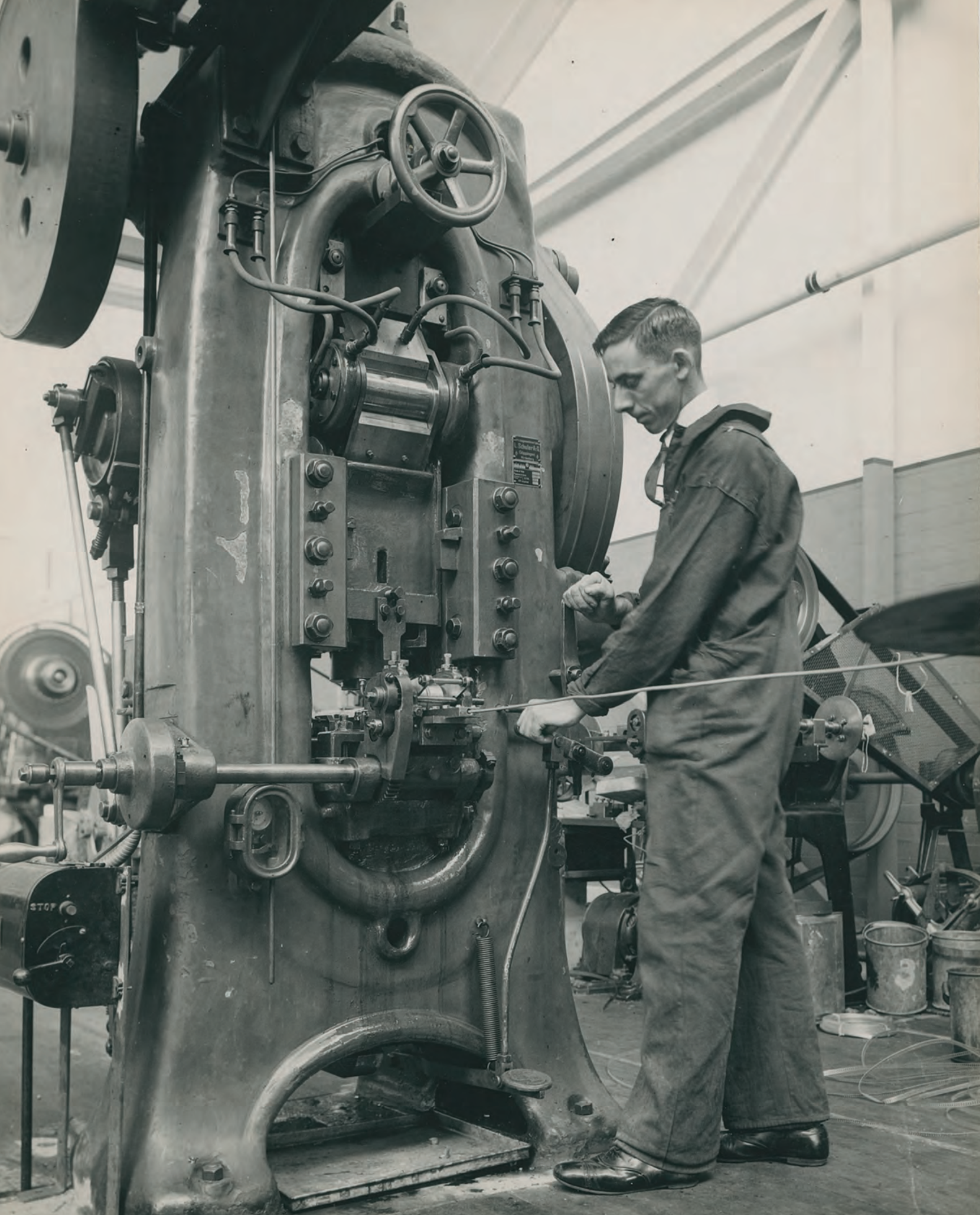
Based on the principle that local manufacturing should prevail even at the risk of losing parent company profits, the ICI London board approved the building of an ammunition factory at Deer Park, which opened in 1936. A facility vital for the national defence, the new factory employed 180 people with the aim of supplying the entire Australian market.

This decision would become an expensive gamble when plant costs proved to be higher than expected. The new factory also had to counter strong brand loyalty to imported American cartridges. Imports, which captured 40 per cent of the rimfire market in 1934–36, were restricted by the Tariff Board in 1937–38, but the commercial facts were that the Australian plant could not survive without these tariff restrictions.

Attempts to do a deal with DuPont, which produced the popular Remington cartridges, ran into US anti-trust troubles. But soon World War II began and any talks about an ammunition alliance soon collapsed, as did the need for one, because Remington exports to Australia ceased.

Despite all the attempts to diversify Deer Park, in 1939 sales of explosives totalled £1.2 million, one third of ICI's total sales and 44 per cent of gross profits. Geoffrey Blainey in his unpublished history of the company concluded that 'an industrialised nation has need of more chemicals than those that blast rocks, but a vigilant monopoly in a major chemical can confer high profits'.

Nylon works for slide fasteners, Ascot Vale, Australia.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5 | The war years

ICI made a substantial contribution to Australia's defence during World War II. The war also saw new innovations and stimulated an expansion of the company.

In modern warfare the distinction between factories producing chemicals that destroy and those producing chemicals that sustain is only glamour. ICIANZ's explosives business was already strong in 1939, but its chemical assets were going backwards and needed to play catch-up to meet the needs of the war. The chemical works at the Yarraville factory spread across cramped acres; a 'new Yarraville' rose on the flattened sandhills of Botany Bay. The company was now invested in four general chemical factories instead of one and its range of chemicals multiplied.

ICI used the benzene from coal tar to make a whole range of new chemicals. Aniline, for example, was very versatile. It was an ingredient of accelerator and antioxidants used to make rubber. It was also an ingredient in explosives and a new drug called phenothiazine that drenched worms in sheep.

The company decided to spend £185,000 on plants to make these chemicals, but the threat of an acute shortage of rubber chemicals in the war made these projects urgent. After hasty shipments from the UK, Yarraville made its first aniline in 1944, using it as a reducing agent in the making of caustic soda and chlorine. Its main raw material came from Deer Park where a new plant nitrated benzene with the acids produced in the nitrocellulose plant. On the same land at Deer Park another plant turned benzene into nitrochlorobenzene, a hazardous chemical used to make the drug phenacetin.

The company also produced pharmaceutical chemicals for the war effort. In the Pacific theatre, troops had to contend with a variety of tropical diseases. At one point, malaria, dysentery, typhus and dengue fever cases outnumbered battle casualties by 15 to one. Malaria was the most serious menace, made worse because the Japanese had captured the cinchona plantations of Java where 95 per cent of the world's quinine was produced, making supplies of the most effective remedy uncertain. Fortunately, at Adelaide University Professor AK Macbeth was studying the chemistry and manufacture of an alternative remedy, sulfamerazine.

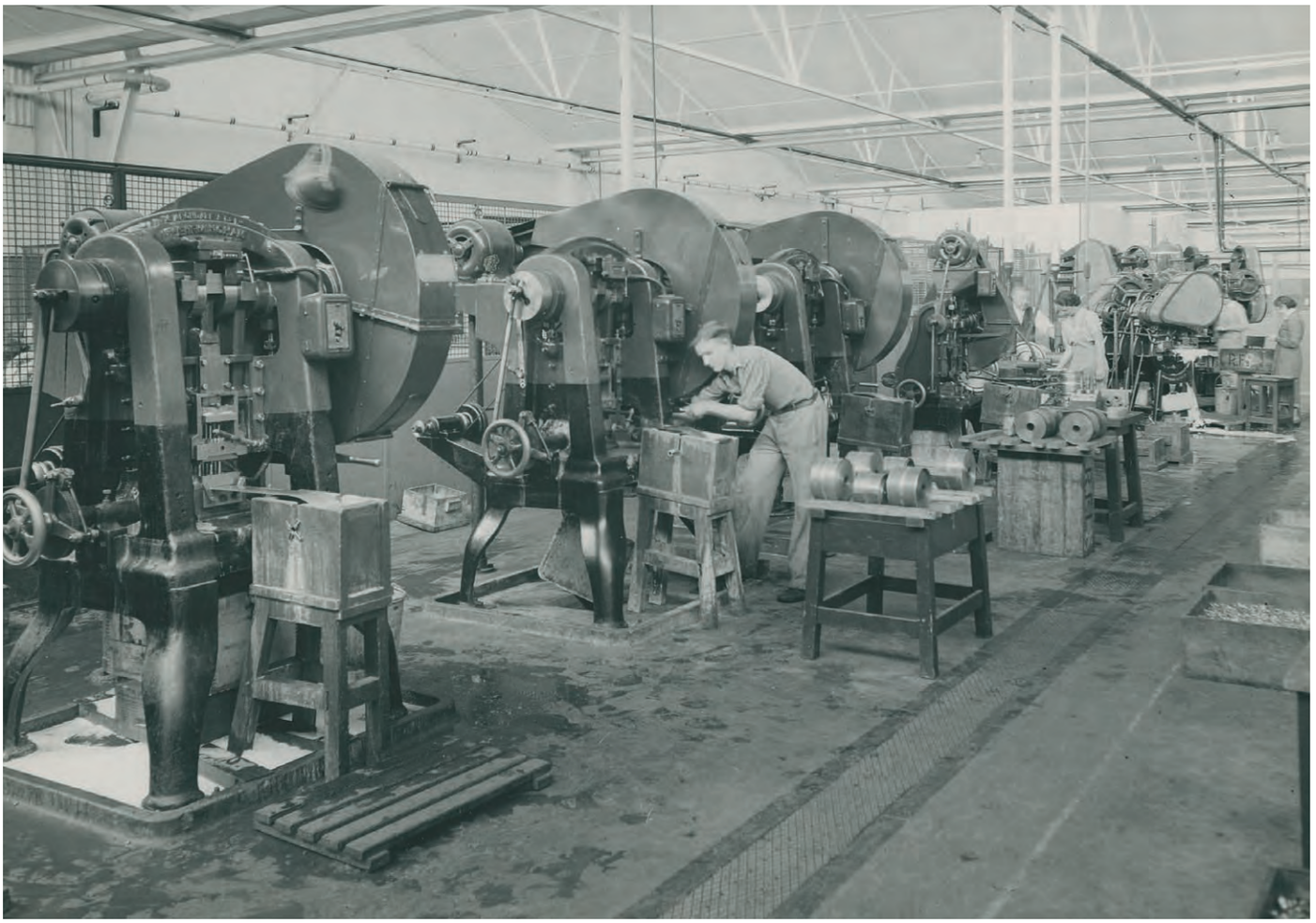
Previous spread: The ammunition factory at Deer Park, Australia, c. 1940s.

Long Service Awards at the ammunition factory, Deer Park, Australia, late 1940s.

In 1943 the government asked Macbeth if the drug could be manufactured in Australia. His response was enthusiastic, and the federal government asked ICIANZ to start making the chemical.

It was a complex process as the company had no experience with fine chemicals but even if it had, it would have had problems. Unlike Britain and the US, ICIANZ had no other plants to draw on to source intermediate materials. These had to be made locally. The company had to operate at least eight major processes using chemicals so corrosive it had to specially make a variety of delicate glass-lined equipment. The plant required chemicals from alcohol to ammonia and chlorine to carbon bisulphide. Thirty tons of raw materials had to be reduced to 10 tons of seven different intermediate substances, and the processing of these 10 tons yielded only 1 ton of pure sulfamerazine.

A pilot plant was established at Deer Park with a staff of 24 draftsmen and procurers working every day for six months, drawing and buying and assembling for the construction engineers. In the haste to find equipment, the plant used household baths and earthenware bread bins with all sorts of gauges and discarded vessels. Perhaps not surprisingly, the first batch was deemed ‘poor quality’.



Metal section at the ammunition factory, Deer Park, Australia, 1943.

On Christmas Eve 1943 the pilot plant was closed, its task accomplished, and soon after, work started on construction of a full-scale factory. After three months the plant was operating smoothly and after 12 months output of the drug was 4000 pounds a month.

But while the factory was making its first tons, tests were made and found the drug was not effective against the benign form of malaria. Atebrin was the most effective drug and the sulphamerazine was released for less serious infections. Although the drug produced by ICIANZ did not defeat malaria, another chemical it produced struck the malarial mosquito itself.

DDT was first discovered by a German scientist in 1874, but just before World War II Paul Hermann Mueller in Switzerland worked out its insecticidal value. ICIANZ was quickly sent to work to synthesise the DDT. The main ingredients—chlorine, benzene and alcohol—were already at hand. The army wanted more and in June 1944 ICIANZ was instructed to build another plant at Yarraville, which by year's end was producing 85 tons a year.

In New Guinea and neighbouring islands thousands of mosquitoes survived the DDT, but simultaneous research in Canberra and Florida in the US found a cream using dimethyl phthalate was the best repellent. In every phase of the war on malaria, ICIANZ was the vital Australian producer, and although it did not make the final cream,

Every government venture in military explosives in some way used the company's engineers and chemists. It could do so because the company had the foresight to begin manufacturing the many explosives that were previously imported.

it supplied the vital ingredient, phthalic anhydride, from its new Newcastle chemical works.

There were other chemical companies in Australia at the time of the war but only one explosives company. The war had challenged the company with new chemicals but with explosives it was on familiar ground.

Every government venture in military explosives in some way used the company's engineers and chemists. It could do so because the company had the foresight to begin manufacturing the many explosives that were previously imported.

The government's Director of Explosives Supply, Thomas Donaldson, a former adviser to ICIANZ, said there was a serious shortage of military explosives and output of TNT should increase by a factor of five times and cordite by four times. Imports from Chile would cost dollars and shipping space so he recommended local manufacturing.

This required more nitric acid, and Donaldson recommended the erection of four synthetic ammonia plants like Deer Park, as well as three auxiliary plants to make synthetic methanol. Each would have a vat for the oxidation of ammonia into nitric acid and two had auxiliary plants for ammonium nitrate.

ICIANZ was the only company that could implement this £2.5 million scheme and was requested to build the plants. One large plant would have been cheaper but also could have been wiped out with one enemy bomb. The four sites chosen were Albion, opposite Deer Park; Ballarat, in Victoria; Mulwala, in New South Wales on the northern banks of the Murray River; and the Sydney suburb of Villawood. ICIANZ's old subsidiary plants, including one at Clyde in Sydney, assisted by raising their output.

Company engineers could build the nitric acid and ammonium nitrate plants quickly, but the ammonia plants took more time. Ballarat could make ammonium nitrate in 1942, but it would be another three years before the ammonia plant was up and running. Alternatives were found by sourcing ammonia from the offtakes of steel and gas plants. The ICIANZ Clyde plant increased its output by 25 per cent.

The first government plant was ready by June 1944, but by then the crisis was receding. Albion and Ballarat were not completed until Germany was defeated and Villawood not until the war was over. These plants were designed for an emergency that did not emerge.

The calls on the company's chemical skills were incessant. When the use of mustard gas by the enemy was feared, the company made the decontaminant chlorosene. A shortage of potassium chlorate endangered match factories so it was made at Yarraville.

But ICIANZ exercised its rights and managed the plants for the government, making ammonium sulphate, methanol for the plastics industry and ammonium nitrate for explosives.

The Albion site made 17,700 tons of high explosives and propellant powders from an impressive list of chemicals made in the factory. In government annexes in its own factory at Deer Park, the company made munitions and explosive chemicals efficiently at short notice.

The calls on the company's chemical skills were incessant. When the use of mustard gas by the enemy was feared, the company made the decontaminant chlorosene. A shortage of potassium chlorate endangered match factories so it was made at Yarraville. A scarcity of smoke-producing chemicals forced the company to make stannic chloride and titanium, tetrachloride. Yarraville's chlorine capacity was more than trebled.

Osborne made its alkalis and large tonnages of calcium chloride to stabilise the dusty soil on new flying strips. Deer Park increased its output by one third to supply US and Australian mines and earth-moving projects. Tens of millions of feet of the company's zips went on soldiers' and flyers' uniforms. The leathercloth factory made groundsheets, dyed uniforms and camouflaged hessian.

The government provided the £6 million spent on new chemical plants, but the company's spending on new plants was close to £1 million, more than its profit. The only way to obtain real relief was to raise capital through the issue of £500,000 worth of new shares to investors in 1944, the first by the company.

At the end of the war the company's issued capital was £6.5 million, more than three times its original capital. The new shares were not listed because they were tightly held by a few companies. The only shares issued to the general public were one million 5 per cent cumulative preference shares sold to 3000 investors in Australia and New Zealand in 1938.

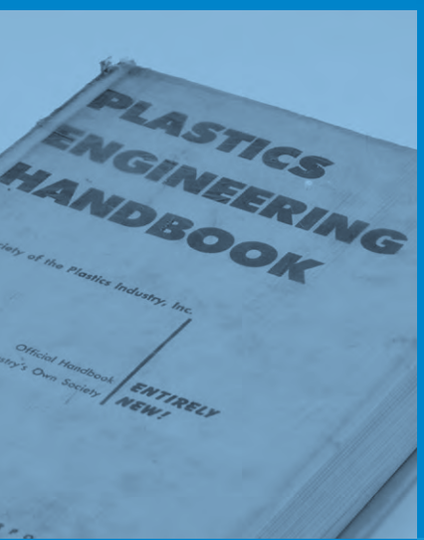
The British parent company was still the dominant shareholder of ICIANZ, with 3.9 million shares (up from 2.1 million), but its proportion of total shares had fallen from 91 to 71 per cent, in line with McGowan's dictum that ICI should restrict its investment in Empire and foreign countries. Nearly all the remaining shares were held

Slide fasteners team at the ammunition factory, Deer Park, Australia, 1940s.

by ten companies, six being miners, two fertilisers, one glass company and one pastoral house. All paid cash except Commonwealth Fertilisers, which took its 14.5 per cent shareholding in exchange for its Yarraville chemical works. The only other with a material stake was BHP with 5.2 per cent.

Sir Lennon Raws had favoured the idea of large corporates owning the shares rather than the investing public, with the reasoning this would strengthen the bond between ICIANZ and its customers (and potential competitors). Australian Glass Manufacturers was offered shares because it bought most soda ash and might be tempted to make its own. BHP was offered shares because its by-products of ammonia and coal tar could lead to the making of many chemicals in competition with ICIANZ. BHP made it known that its shareholding would not deter it from making whatever chemical it deemed profitable. But at least their contact was friendly.

ICIANZ had shares in only one of these companies, 4 per cent of Commonwealth Fertilisers. It held shares in a range of others, including Metal Manufacturers, Australian Fertilisers, Albright & Wilson and the Victorian Ammonia Company.



6 | The move into plastics

The global chemicals industry has long leaned heavily on the work of others. ICI may have been the Imperial Chemical Company, but its four founding constituents all had a distinctive international favour. Nobel was based on the work of a Swede, United Alkali relied heavily on German inventions, Brunner Mond's alkali industry rested on the ingenuity of a Belgian. The British companies improved the processes and invented new techniques, but they were also aware their role was enhanced as an amalgamation into one powerful company.

Plastics was one area that greatly benefited from ICI Plc research, which was financed on a scale undreamed of by the original companies. The sector had been tilled over internationally for 25 years before ICI became involved.

The founder of the synthetic plastics industry was a Belgian former chemistry professor, Dr Leo Baekeland, after whom Bakelite was named. He shook the maxim of organic chemistry, which said the only valuable products of chemical reactions were either crystals or liquids. In 1909 he produced a resinous mass by reacting phenol (carbolic acid) with formaldehyde and listed 27 ways in which his resin could be used industrially.

His estimate proved conservative. He showed that by pouring a powder of phenol formaldehyde into a space between two steel dyes and heating the powder until it flowed, he could press and shape articles that set hard and would not again dissolve or melt. The colour of Bakelite was invariably brown because phenol reacted slightly with the air, but early attempts to add colour were expensive.

By the 1920s, chemists understood the key to the anatomy of plastic materials were long, tightly knit chains of molecules and the trick was how to join the molecules together. Carbon was the basis of all plastics so coal and oil provided potentially cheap raw materials from which new molecular patterns could be forged.

The scientific success in using chemicals that otherwise would have gone into waste provided an opening, but there was little incentive for the oil refineries to look at plastics, so the makers of synthetic ammonia stepped in. They produced methanol, which made formaldehyde. This was a main ingredient of urea and phenolic moulding powders.

Previous spread: Research at the central laboratory, Deer Park, Australia, 1937.
Right: Fabrics finished store at Deer Park, Australia, 1964.


CLARK

This gave ICI the springboard to leap into plastics. It planned to extract oil from coal so it could produce phenol from coal tar, and as a manufacturer of dyestuffs it could supply the pigments or colours for the moulding powders.

In a note to ICIANZ chief Sir Lennon Raws in July 1933, ICI chairman Sir Harry McGowan said when he unveiled plans to enter the market, 'it is certain that the peak consumption had not been reached'. This was something of an understatement.

Ironically, the new plastics division did not make the discoveries that were to give ICI dominance. They were made in the laboratories that ostensibly had no interest in plastics and even before the company formally moved into the sector.

In 1932 a young Nobel chemist, Dr John Crawford, filed a patent for making 'methyl methacrylate monomer', better known as Perspex, the glamour plastic of the war years. By 1936, ICI's Billingham factory was making 25 tons of Perspex, which transmitted more light than glass and didn't splinter so it was ideal for fighter aircraft windows. During World War II, ICI Plc built and operated two huge Perspex plants for the government, and by 1945 the company's annual output was 6000 tons.

In 1933 the old Brunner Mond lab in Cheshire discovered polythene. Years passed before the company was making these new plastic materials on a large scale. Polythene proved to be the best insulating material for high-frequency radio, television and radar. Compared to another material, though, polythene was still an infant. Another plastic, polyvinyl chloride (PVC), replaced rubber in covering cables after Malaya and its rubber plantations fell to the Japanese.

In Australia, ICIANZ was at first content to import moulding powders, Perspex, PVC and various raw materials. The local demand was low and Australia did not possess the same necessary cheap ingredients.

The most popular moulding powder was made by extracting phenol from the coal tar of the Sydney gasworks, which was being done by Timbrol Ltd. A combination of phenol and imported formaldehyde was used by Monsanto Chemicals Australia. By the middle of World War II there were more than 100 Australian companies moulding plastic articles. To meet demand, Monsanto made its own synthetic phenol and formaldehyde.

ICIANZ, like its parent, was a latecomer to the industry. It sensed the future of plastics, but its focus was elsewhere. In the war it even rejected the Australian Government's request to make Perspex, but it later agreed to make PVC at Botany.

By the end of the war, ICI was more capable of making plastic materials than it had been in 1939. It produced enough chlorine to make PVC and, if needed, Deer Park could make formaldehyde. Three of its factories made caustic soda, 20 per cent of which was used to make synthetic phenol. With its own supply of chemicals and ICI Plc's techniques and vital patents, ICI had the incentive to make plastic materials.

If the prize of the new venture was high, so was the price. The company could invest millions to make one type of plastic only to see a slice of the market captured by a newer one with a lower price or superior qualities.

Each month in the US new materials were invented, manufactured or put to new uses. Polythene, polystyrene, PVC and Perspex were hallowed names at the end of the war, but who was to know their decline would be just as drastic as their rise?

Collection of early items from ICI plastics, including the first recycled vinyl bottle, May 1991.

The Tariff Board in March 1946 issued an edict saying, 'the manufacture of plastics in Australia must be undertaken with a full realization of the risk any product may become obsolete'. The chances of high tariff levels then were not great.

ICIANZ was not used to stepping into an arena where the rules were lax and the competition strong at home and abroad. But at least it had one source of strength against other Australian manufacturers: its interests in chemicals, explosives, alkalis, fabric and ammunition were so large and dispersed they could sustain the plastics venture, even if it fell on hungry years.

Its first factory made the moulding powder urea formaldehyde at Deer Park. Formaldehyde gas was being produced at the synthetic ammonia plant across the paddocks, and urea was imported as a white solid from ICI in Billingham.

After some early production difficulties, ICIANZ's Mouldrite powders soon won half the market before new products flattened demand. The curve of advancing sales suddenly flattened and after 1953 it dipped. The factory still worked profitably around the clock but it had that surplus capacity that only new orders could satisfy. The one consolation was the company also made the newer plastic materials, which were outshining the traditional moulding powders.

After the war, the demand for PVC jumped quickly, and soon it was no longer regarded as a mere substitute for rubber. The fabrics factory at Deer Park began to coat fabrics for upholstery with PVC, and soon the telephone cables and electrical wires of most homes were coated with it too. PVC came to be used extensively in customer and industrial products from effluent and stormwater pipes to cable insulation.

In 1949 Australia used 1000 tons of PVC a year—all of it imported—and ICIANZ confidently built its first PVC plant at Botany, with production starting in 1950. The company's plea for protection was answered by the government with a 25 per cent duty against UK product and 45 per cent against other imports.

The new plant used mainly Australian chemicals. The original Botany plant was soon inadequate and was replaced by a larger one. By the end of 1954, Botany was capable of producing 6000 tons of polymer a year. But behind the consoling statistics of rapid expansion was one serious defect. The real capacity of the plant was far below its rated capacity and there were more technical problems, which meant at times the company had to import PVC from England to satisfy customers.

ICIANZ was the only Australian manufacturer, but it did not dominate the local market. In the 1950s there was a global glut and in early 1959 more than half the PVC used in Australia was imported, much of it from Japan, where cheap labour gave manufacturers there a competitive advantage. Complaints to the Tariff Board failed as the evidence suggested it was Britain, not Japan, that was dumping and no action was taken to protect ICIANZ. Increased efficiency was the only answer.

But the PVC plant had earned virtually no profit on much capital in nine years and the hope turned to a new plant at Botany making polythene.

In 1954 Sir Archie Glenn, ICIANZ's managing director, predicted that within four years Australia would consume up to 3500 tons of polythene annually. The market alone justified building a polythene plant at Botany. But another incentive was that the company's main patent would expire in 1960. The new plant had to come in quickly to discourage possible competitors.

Polythene was made by polymerising ethylene gas (combining molecules) at very high temperatures and pressures rising to 30,000 pounds per square inch. Ethylene was most easily derived from oil refining, but this was not economical for the small plant proposed. Instead, the company turned to CSR and the ethylene in alcohol extracted from the sugar producer's molasses.

The process worked well, and the plant was doubled because the company knew it had to meet demand while it retained a monopoly. The gap was in high-density polythene, which ICIANZ did not make but could have been made by others with no other use for the ethylene derived from breaking down oil into smaller molecules (cracking).

Fears of new competition were soon realised in 1959, when Vacuum Oil unfolded a plan to make the product by cracking oil at its refinery in Altona on Port Phillip Bay, and Union Carbide combined with BF Goodrich to make PVC.

The shores of Port Phillip Bay soon rivalled those of Botany Bay as the hub of the plastics industry. Plastics became the heart of the chemicals industry.

The fabrics factory at Deer Park used PVC film for raincoats, shower curtains and tablecloths, and by 1959 it was making nearly ten times as much PVC film as it made cellulose-coated fabrics. PVC was also used extensively in consumer and industrial products such as effluent and stormwater pipes, gas lines and cable insulation. The use of chlorine-based products in time also left the company with a massive remediation headache that is still being felt today.

The company's dual role as a manufacturer and processor created tensions with competitors. They used raw materials from the same company that competed against them in the finished product market.

The company also imported material for which demand was not strong enough to make locally, including Terylene, a synthetic fibre. ICI was making the product at Wilton in North Yorkshire and the company did its best to stimulate demand. Terylene became highly popular, outshining every product on the company's books. ICIANZ sold its first consignment of Terylene yarn to textile mills in 1954.

The product was enmeshed in competition from rival products such as Dacron from DuPont, and traditional fibres such as wool and cotton. The fight between Terylene and wool was particularly delicate because as a maker of agricultural chemicals ICIANZ had one foot on the sheep's back and as an importer one foot on its tail.

Apprenticeship school presentation at Deer Park, Australia, c. 1950s.

Nevertheless, Australia quickly became the best export market for ICI Plc's Terylene.

The company's growth statistics in the post-war years were impressive. Profits rose from £300,000 at the end of the war to over £1 million in 1950, and by 1958 they were approaching £3 million. The company employed 3566 people in 1945 and 6100 by 1958.

In 1958 for the first time ICIANZ became the parent company's largest customer, but only 32 per cent of sales were imported chemicals compared to 45 per cent in 1949. Australian chemicals were the mainstay and the source of expansion after the war.

Despite the success of the new plastics, the making of high explosives was still the main game. The centre of the activities remained Deer Park, where the black chimney symbolised the company's dependence on explosives. The Snowy Mountains Scheme, which commenced in 1949, used in one firing 103 tons of the company's explosives, more than Deer Park used to make in two good years.

The second most profitable venture was the alkali works in South Australia. In alkalis, as in explosives, ICIANZ was the only local maker. Prime customers for alkalis were glass and soap makers, but there were many others. The aluminium industry, for example, used soda ash, while oil refineries used caustic soda.

In the 1950s ICIANZ spent more on scientific research than any other Australian company. That was an achievement for a company that, until the end of World War II, preferred to rely on the research conducted by the British parent.

While Nobel was considered a tough employer, ICIANZ was a model boss. ICIANZ work councils were adopted, where staff had an input on policies, and everyone who worked for five years or more received a bonus.

Because its name didn't appear on consumer products, ICIANZ was not seen by the average consumer as a big company. Happily, this meant it avoided popular scrutiny.

7 Early moves into chemicals

Of the four companies that merged into ICI, Nobel's initially had the most links with Australia, and it continued to push them long after it ceased to be an independent company. The concentration in manufacturing at Deer Park followed the Nobel formula.

The first big venture outside Deer Park was in the alkali industry. It was also both the first venture into heavy chemicals and the first in which other constituents in the ICI merger used their skills.

Australia was a rich market for alkalis. The white opaque soda ash or sodium carbonate was a basic ingredient of glass and soap. It neutralised acids during the bleaching of wool and the flotation of gold and non-ferrous ores, secured the grease from wool, reduced the sulphur in iron and steel, and softened the water in outback towns. Alkali sodium bicarbonate aerated flour and cordials, neutralised acids in butter factories and tanneries, and injected carbon dioxide into fire extinguishers. Caustic soda made soap, detergents, pharmaceuticals, insecticides, textiles and paper. Virtually every Australian industry used the alkalis that ICI founding shareholder Brunner Mond had previously imported from its English plant.

Frenchman Nicolas Leblanc invented the process that became, for nearly a century, the core of the heavy chemical industry. He took common salt and decomposed it with sulphuric acid to form sodium sulphate, which was further processed to become sodium carbonate (soda ash, Na_2CO_3). In 1791 he took out a patent and began to make soda ash at Saint-Denis, but the patent and factory were confiscated in the French Revolution, and he took his own life.

The ammonia–soda process was developed into its modern form by the Belgian chemist Ernest Solvay during the 1860s. The Solvay process is the major industrial method for production of soda ash. A concentrated solution of salt is saturated with ammonia and then carbon dioxide, making sodium bicarbonate, which can easily be turned into soda.

While Nobel was building the first nitroglycerine factory in Sweden, Solvay was building the first ammonia–soda plant in Belgium. It opened in 1864 and its success

Previous spread: ICI Yarraville site in Australia in the early years.

Loading the truck for deliveries at the Yarraville site.

attracted the interest of John Brunner and Ludwig Mond, who streamlined and transformed the process, erecting their first factory in Cheshire, England, in 1874.

ICIANZ later imported the British alkalis. In 1914 a South Australian salt company unsuccessfully applied for a protective tariff.

Four years later, when the war was at a crucial stage, alkali imports wilted because ship movements were limited, resulting in Australian industry suffering. Production of military and industrial explosives was threatened because it depended on glycerine that came from the soapworks, which in turn depended on the imported alkalis. The making of paper, glass and pharmaceuticals was also threatened, affecting the textile trades.

Russell Grimwade, chief of Australian Glass Manufacturers Ltd, was commissioned by the federal government to seek a remedy and examine just how to start a local alkali industry. Choosing the ideal manufacturing site was the first step.

An alkali works had to be close to salt and fresh water and within easy access to coal. Thomas Haynes from the Mount Lyell chemical works suggested a salt lake on the Western Australian coast. But by now the war had ended, imports were available again and ICI founding company and British exporter Brunner Mond had opened offices in

Overseeing the rail works.

Sydney and Melbourne to study the prospects of creating an alkali industry in Australia. Others were looking, including Adelaide-based entrepreneur GK McPhail, who settled on Port Adelaide as the ideal site, with a good port, marshlands that could be converted to salt fields, and a good supply of water and electricity. He took his ideas to Sir Lennon Raws, who later commented the idea was good but said McPhail 'has nothing to sell but his ideas'. But McPhail kept pushing and took his plans to the politicians in Canberra and Adelaide.

ICI was at first sceptical, arguing that consumers would face higher prices if a local plant was built. In September 1932, on behalf of ICI, Benjamin Todhunter presented a report to Canberra playing down the chances of a local plant, which he argued would produce alkali twice as expensive as the equivalent UK product.

But Sir Lennon Raws thought the federal government might back a plant even as the parent company wondered about the impact this may have on its struggling Solvay plant in Cheshire. Raws rallied to the cause in 1932, due in large part to the depreciation of the Australian pound against the British pound, which raised costs by 25 per cent.

After much discussion and myriad government reports, in April 1935 ICI directors in Britain sanctioned the South Australian project and two years later they transferred ownership to ICIANZ. By March 1940, with Australia back at war, the plant was working, although the project went 40 per cent over budget estimates, but Australia was now producing soda ash.

Australia's demand for alkalis had grown from 29,000 tons in 1931 to 90,000 tons during World War II.

The original promotor, GK McPhail, was naturally not impressed at how his ideas had been put into effect by someone else, but eventually he accepted a £5000 settlement.

Australia's demand for alkalis had grown from 29,000 tons in 1931 to 90,000 tons during World War II. The Osborne plant at Port Adelaide was designed to produce 32,000 tons of soda ash, 8000 tons of caustic soda and 6000 tons of bicarbonate, and by the end of year one, its output was just 60 per cent of demand. Osborne annually produced more than its designed output, but in the transition from importer to manufacturer, ICI retained its Australian alkali monopoly.

In the early 1930s general chemicals production in Australia was small and feeble. Brunner Mond made bulk and tinned chemicals such as sodium sulphide, acetic acid, water treatment chemicals, methanol and a diversity of chlorine and caustic products. The ICIANZ dyestuffs department imported pesticides, moulding powders, titanium products and a list of profitable products either made by ICI or pushed by its manager, JS Wilson.

ICIANZ was not content to remain solely an importer, but the Australian market was too small and scattered to justify the manufacture of many chemicals. Sir Lennon Raws wrote in October 1932, 'I should like someone who knows sufficient about these chemicals to be able to spend time in fossicking out what are being imported and what are being manufactured in a tin pot way by those small chemical companies which no-one hears about but whose names appear in the telephone book.

'If the business appears to be worth tackling, shall we start at Deer Park or in Sydney or shall we buy out or into an established concern?' he asked.

UK expert Dr Walter Worboys arrived in 1933 and opined, 'a business is usually entered upon with the idea of making a profit either immediate or in the future', and said that a small plant in Sydney might pay its way.

On a later trip, fears were expressed about cheap Japanese bleaching powder, sodium sulphide and calcium hypochlorite that were undercutting ICI's own exports to Australia. The case for a local plant was building and, on a later trip, Todhunter noted 'it is obvious that we cannot hope to hold the market as importers only'.

It was equally obvious the shortest cut to economic manufacture was to buy the chemical business of Commonwealth Fertilisers and Chemicals (CF&C). CF&C was already a competitor with ICI's imports, and the competition would increase because ICI was about to import some of the phosphate products CF&C was making.

The fertiliser industry was strongest in Melbourne because the Victorian wheatlands were the first to cry out for phosphate.

Fertilisers were the meat, chemicals the spice, and ICIANZ wanted the spice. ICIANZ suggested to CF&C that if the chemical works could be placed in a separate company, it would buy a half share.

But ICI baulked at the idea of only owning half, deciding it could not assign all its processes and the fruits of expensive research to a company in which it would hold only a half interest. Eventually a deal was struck in which CF&C would hand over its Yarraville chemical works in return for 16 per cent of ICIANZ.

CF&C continued to make superphosphate, sulphuric acid, sheep dip and cattle licks. Beyond this narrow orbit, ICIANZ took over all other products and acquired the old Mount Lyell wharf, power plants and a range of chemical products, of which chlorine was one.

Fourteen acres of land were fenced from the chemical works and were considered ample for the company because it expected the spectacular growth in general chemicals would be in Sydney. The plant erected beside the ICIANZ chemical works at Yarraville claimed to be the first phosphorus factory south of the equator. Its opening in 1940 was opportune, making phosphates just as the war was limiting imports from the UK.

Expansion was inevitable, and Albright & Wilson (Australia), a joint venture between UK-based Albright & Wilson and ICI, began to manufacture phosphorus at Yarraville in an electric furnace that burned quartz and the same yellow phosphate rock that was used to make superphosphate. The company was sold in 1991 and eventually became part of the Singapore-based Universal Interchemicals Corporation Pte Ltd.

From the phosphorus flowing in from the furnace the company made amorphous phosphorus, phosphoric acid, calcium phosphate, food phosphates, and di- and trisodium phosphates—all essential for food or munitions.

Except for the alkali works on the east coast of South Australia, ICIANZ had expanded solely in Melbourne. The fertiliser industry was strongest there because the Victorian wheatlands were the first to cry out for phosphate. As Australia's population and market were for decades too small to sustain competing factories making the same chemical, Melbourne remained the centre of the chemical industry. But when demand for chemicals widened and smokestacks sprouted in Sydney, the advantages of New South Wales as a place for chemical manufacturing seemed decisive. It had the coal seams and the steel mills and it was at Newcastle, in the shadow of the BHP blast furnace smoke, that ICIANZ planned its first factory in New South Wales.

Commonwealth Fertilisers and Chemicals despatch office in Yarraville, Australia.

The BHP steelworks and galvanising plants used two chlorine products, ammonium chloride and hydrochloric acid, and on the outbreak of war it was clear these chemicals should be made at Newcastle. The Newcastle Chemical Company, a joint venture of ICIANZ and BHP, was formed. The galvanising works had first call on all chemicals, paying a price that would yield a profit of 10 per cent on capital after depreciation and taxes. Surplus ammonium chloride was sold to tanneries, canneries, dry battery manufacturers and other galvanisers. The by-product, salt cake, went to glass and paper works.

The factory, located in the Newcastle suburb of Mayfield, made its first ammonium chloride and hydrochloric acid in the winter of 1940. New chemicals were planned. The coke ovens of BHP produced coal tar, which contained naphthalene. Oxidised in the presence of a heavy metal oxide catalyst, naphthalene produced phthalic anhydride—a chemical used in the manufacture of lacquers and plasticisers. This had previously been imported at prohibitive prices from the US, so the merits of local supply were clear.

ICIANZ had no experience in the chemistry of coal tar, so ICI London's dyestuffs industry at Huddersfield would be consulted. It did not lean on the parent entirely for help because the new plant was designed by a DuPont process for which ICIANZ had a licence.

Aerial image of the Botany site in Australia in the early days.

The chemical works at Newcastle fitted more than the needs of the steel industry for the general chemicals market of New South Wales. That market could only be served from Sydney and, while the company had looked at serving it since 1933, World War II provided the impetus for investment. In 1940, ICIANZ had begun to buy 148 acres of market gardens, sand pits and piggeries near the shores of Botany Bay.

The Botany site had the space for expansion that Yarraville could never find, sandy subsoil, artesian water not far below the surface, a sewerage system to drain the effluent, a railway to haul in raw materials and a nearby gelatine factory to consume some of the acids. The only wasted asset was the Bay, which was a source of neither transport nor salt to a factory that wanted both.

Botany was intended at the outset to be just a small replica of Yarraville, with chlorine the foundation on which the new factory could grow. On advice from ICI London, the chlorine plant was doubled in capacity to produce 3000 tons a year, of which half was to be used during the war producing bleaching powder as a decontaminating chemical and hexachloroethane as a smokescreen chemical.

In 1942 Botany made its first chemical, carbon bisulphite, which was used to kill insects in sugar cane and make the xanthates that floated the minerals in crushed ore.

The war was ending just when the chlorine plant was coming into its own, but the diversified plant was not wasted. It was ready to serve Sydney's post-war growth, and the adjacent sandhills were earmarked to house the glamorous branch of the post-war chemical industry: plastics.

In the decade to 1946, ICIANZ had overcome its late entry into general chemicals and entrenched itself as the premier manufacturer in the country. In Melbourne and Sydney it had the largest chemical works in Australia. At Newcastle it partnered with the steel masters; at Yarraville it was partner with the great British phosphates maker producing specialised chemicals. The Australian chemical industry had moved from the backroads to the highways and in this transition ICIANZ was undisputed leader.

The company's two boldest plans for Australia hinged on processes that had been invented by the Germans. One plucked nitrogen from the air, and Todhunter saw its relevance to the wheat and sugar fields of Australia. The other turned coal into oil, and for a country that imported all its petrol and oil, the value was potentially dramatic. The scope for ICIANZ in Australia seemed limitless.

Synthetic nitrogen was a technique invented by Fritz Haber and tamed by Carl Bosch in Germany in the early 1900s. Synthetic nitrogen at first seemed more promising than synthetic petrol, but after a visit in late 1928 and early 1929, Todhunter left thinking his own plans for a synthetic ammonia plant were premature.

The market for petrol was, however, immense as Australia extracted a negligible quantity of oil from shales. The oil drills had pricked the outback from Alice Springs to Roma, but geologists doubted if Australia would ever have a payable oilfield. Still, there were hopes the federal government might protect synthetic petrol on strategic grounds.

The basis of the process was the similarity of coal and petrol. Petrol consists of 85 per cent carbon and 15 per cent hydrogen, whereas coal has about the same proportion of carbon but only 5.5 per cent hydrogen. Chemists hoping to produce petrol from coal had to take out the 8.8 per cent of extraneous elements, such as oxygen and nitrogen, and replace them with hydrogen. By producing hydrogen separately, chemists found that they could drive out the superfluous elements with the hydrogen, raising the hydrogen–carbon ratio to that of petrol.

The thick seams of brown coal (lignite) in eastern Victoria attracted ICIANZ, and in May 1928 Sir Lennon Raws handed the Premier a note asking that coal beds be reserved while ICIANZ experimented on Victorian coal. Initial tests were positive and ICI London responded, 'our tests on Yallourn lignite have been extremely satisfactory and if oil from coal is a commercial success anywhere it will be in Australia'. New Zealand also had brown coal of promise in the South Island mountains.

The field was getting crowded with potential competitors, but ICIANZ decided to approach the three strongest: BHP, the Baillieu group and Howard Smith. The parent company offered to sell its patents to a common company, which could then find a suitable coalfield, experiment on hydrogenation and finance a large factory when the time was ripe.

In June 1929 a new company was formed. On the basis of the returns, Todhunter cabled news, 'I am confident that during this year we shall have processes for production of oils from bituminous coals in Australia'.

In Canberra, Prime Minister James Scullin assured an ICI lobbyist his government would not be timid in protecting a local factory. From London in May 1930 came news that petrol could certainly be made successfully from Victorian brown coal. Now the race was on to build the plant, with the battle between the Newcastle region in New South Wales and Port Welshpool in Victoria's Gippsland.

While this played out, reports from London were becoming more constrained. Petrol from coal was possible, but despite all the experiments and modifications it could not compete with oil from the well.

After 1932 the experiments on Australian coal ceased and the process awaited advances in technology, or government support. The million pounds ICI had invested were not wasted because tests continued on British coal. A pilot plant was set up next to the ammonia works at Billingham. The Australian Government watched the progress closely, but concluded the costs of a plant would be three times the cost of importing flow petrol.

After a long absence, ICI chair Sir Harry McGowan (now Lord McGowan) arrived in Australia in January 1937. In February, BHP's Essington Lewis held a dinner at his Melbourne mansion, 'Kooringa', hosting Prime Minister Joseph Lyons, Treasurer RG Casey, McGowan, Todhunter, Sir Lennon Raws and Norman Taylor. After dinner, the subject of the synthetic petrol plant was raised and it was made clear only national security could justify its establishment. Lord McGowan said if the defence claims were serious, he would build the plant. But when the prime minister left that evening, his manner suggested he would not find the necessary money for the plant.

Just when the plan to manufacture synthetic petrol collapsed, the old plan to make synthetic ammonia materialised. It was the miner, not the farmer, who wanted the nitrogen. With the rising demand for explosives, Deer Park sought cheaper nitrogen and the obvious source was ammonia. It could make the ammonium nitrate that for 40 years had been the main explosive in coalmines and was now challenging nitroglycerine explosives in metal mines and quarries.

In January 1934 Deer Park compiled its first estimate and concluded that by spending £202,000 it could earn a profit of 21 per cent a year. This ignored the fact that under the contracts some of this saving would have to be passed on to the mines and, in fact, the profit was more like 7.3 per cent.

Until Deer Park made ammonia, ICI would continue to depend on Britain and South America. The purchase of the chemical works from Commonwealth Fertilisers seemed to offer a superior site for the manufacture of synthetic ammonia. The ammonia could be burned over the red-hot catalyst to produce 60 per cent nitric acid; the strong sulphuric acid made cheaply by Commonwealth Fertilisers for the production of superphosphate could be used to strengthen the nitric acid to 98 per cent. The weak sulphuric acid produced from the subsequent denigration (removal of nitrogen) process could be pumped back to the fertiliser works and the strong nitric acid could go in tankers to Deer Park to make nitroglycerine for explosives.

This cycle could yield an annual profit of 25 per cent. Further, it could make Australia self-sufficient in nitric acid, in case war should cut off Chilean nitrates.

The prospect of self-sufficiency was also an argument that might persuade the government to ban the cheap Japanese explosives about to hit the market. To strengthen

The prospect of self-sufficiency was also an argument that might persuade the government to ban the cheap Japanese explosives about to hit the market.

the argument, gas companies had considered building their own synthetic ammonia plants.

ICI's Todhunter had first rejected the synthetic ammonia plan as premature. A potentially long-running rift between ICI and ICIANZ was averted due to the intervention of Lord McGowan, who fortuitously was in Melbourne and realised that while the returns were not as glowing as claimed, they were still attractive, and the company had a duty to make the company independent of the foreign ingredients of imported explosives.

On 8 February 1937 the board voted to spend the quarter of a million pounds necessary to proceed with the synthetic ammonia plant. By Easter 1940, it was almost complete after the last-minute shipment of necessary pressure gauges. In June 1940 the plant started up.

In terms of defence, no more vital commercial infrastructure had been built in Australia. In building and working the plant at Deer Park, the company had skills and knowledge that the government soon harnessed.

With ammonia, the plant could produce fertilisers to expand production of sugar and wheat and cereals on which the troops depended; with ammonia it could make the explosives to blast roads and airfields and mine copper and tin and the metals of war; and with ammonia it could become an arsenal manufacturing the ammunitions of war.

The controversial decision to start the plant was an essay in foresight as the Japanese marched south.


ORICA

8 Shifting the emphasis in chemicals

Not long after Barbara Gibson stepped down from running the chemicals division in early 2005, the new chief executive, Graeme Liebelt, split it into two operations, manufacturing under John Beevers and trading under Bronek Karcz. The line internally was that either it took two men to replace one woman or Liebelt was widening his succession potentials and maximising the excellent track record of the division's trading platform.

Gibson had joined ICI Australia 20 years earlier, headhunted from UK-based medical diagnostic equipment company Amersham International to join the company's pharmaceuticals division.

Chris Hampson, the new chief executive of ICI Australia, headhunted from ICI Canada, had embarked on a transformation of the company. He stepped up its focus on safety, making it a key part of executive performance pay, and shifted the company focus to lift the emphasis on marketing and take a more customer-focused approach.

Gibson worked her way through the company, taking on key roles, including head of research and then head office roles in strategy and other functions, before being appointed as head of the chemicals division by boss Philip Weickhardt in 1998.

ICI Australia always regarded itself as a chemicals company and in 1981 the annual report stated that 'the purpose of the company is to produce chemicals and related products and services to satisfy needs and improve living standards of the community'.

The division had four key functions: chlor-alkali, which was chlorine and related products; mining chemicals, centred on cyanide; adhesives and resins; and polyurethane, a foam-based product used in building insulation, car steering wheels and other products. The latter division went with the global business to Huntsman, with the deal closing in 1999 for a profit of $26.1 million after ICI Plc sold out of Australia in 1997.

Trading was seen as a key opportunity: the company had the infrastructure in place with terminals around the country, plus a customer and supplier base that gave it a clear advantage against competitors.

Orica not only had a stranglehold on the terminals; more of the chemical-laden ships arriving in Australia were carrying goods for its customers. Size begets size. The

Previous spread: Orica team member on site in Papua, Indonesia.
Right: Inspection of ammonium nitrate, New South Wales, Australia, 1995.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Orica team at Yarwun in Gladstone, Australia.

chemical trading business, Chemnet, was supplying 10,000 products from 400 suppliers to 15,000 customers. Orica's mantra boasted it 'turns science into solutions that satisfy basic human needs'.

When Malcolm Broomhead took over as chief executive in 2001, a new regime was set with clear rules. Division heads had to earn the right to grow and this was defined as earning returns over 18 per cent. Gibson was the company's only female division head, and the only one working from One Nicholson Street.

In 2002, the chemicals division had clocked up its fourth consecutive year of double-digit growth.

Broomhead operated by giving management free rein so long as hurdles were met, and Gibson fulfilled these criteria.

The company culture had four planks: safety, health and the environment ('ensuring our future'); commercial ownership ('run the business as if it is your own'); creative customer solutions ('think differently, swiftly capture the value'); and working together ('success as a team and success as an individual'). The bottom line was an instruction to 'deliver on the promise'.

At a time when costs were slashed with 15 per cent of the staff, the 8000-plus employees remaining had their focus firmly on what they needed to do. In the 2003 annual report, chair Don Mercer wrote, 'Orica is a niche chemical company which has begun to move into strategic growth.'

In 2000 the chemicals division posted earnings of $61.9 million on operating revenues of $711.8 million; mining services that year posted earnings of $126.3 million

By March 2005, the chemicals division had broken the $1 billion mark in sales for the first time, posting earnings before interest and tax of $78.5 million on net assets of $409 million and a return of 20 per cent.

on revenues of $1.4. billion. By March 2005, the chemicals division had broken the $1 billion mark in sales for the first time, posting earnings before interest and tax of $78.5 million on net assets of $409 million and a return of 20 per cent. In the same year, mining services had sales of $411.9 million, earnings of $60.8 million and a return of 19 per cent.

Having targeted chemical trading—or Chemnet, as the division was called—for growth, mergers and aquisitions (M&A) opportunities were examined, but going from the drawing board to finalising the deal was proving tricky. Broomhead recruited several key personnel from his days at North, one being a young corporate lawyer called Andrew Larke, who used his skill and charm to good effect, and the deal flow started in earnest.

In September 2002 Orica acquired the Fernz trading operations and some industrial chemicals from Nufarm and in turn sold its crop protection business to Nufarm. The business was jointly owned with the 70 per cent–owned Incitec. The $315 million crop care sale to Nufarm also came ahead of the exit of the Incitec fertiliser division.

As chemicals grew, the restructuring of the company went on around it. There were winners and losers. Take the example of Qenos, a loser.

Back in July 1999, ICI Australia had merged its olefins and hydrocarbon businesses in Botany and Altona with ExxonMobil's Kemcor business to form Qenos. Qenos was the sole manufacturer of polyethylene and polymers within Australia, priding itself with the notion, 'if you see or use plastic in your household items, it was probably made by us'. Qenos polyethylene was used in many applications, including stretch wrapping, food packaging, rotationally moulded products such as water tanks, and moulded plastic products including wheelie bins, and as the lining for milk and juice cartons.

The Qenos site at Botany had four plants, identified as Olefins, Alkatuff, Alkathene and Site Utilities. The Olefins plant processed ethane feedstock sourced from the Cooper Basin in South Australia into around 250 kilotonnes of ethylene per year for the two downstream polyethylene plants and other domestic and export customers. The company once boasted, 'We multiply the value of Australia's Bass Strait and Cooper Basin gas fields by sustainably harnessing ethane and liquid petroleum gas for local conversion.' Access to cheap gas has been a constant complaint for ICI/Orica and Qenos for much of their history.

Mining chemicals is a growing part of the Orica product range as the company matches customer needs for future-facing metals such as copper, nickel and lithium.

In 2002, as Orica struggled with a difficult economy and continuing severe disruption from import competition in petrochemicals and plastics, the company wrote down the value of the Qenos operations to zero. Capacity to meet the demands of a slowing economy was eroded by increases in Australia's cost structures. In 2005 Qenos was sold to China National Chemical and three years later it became a subsidiary of China National Bluestar (Group) Co. Ltd.

Qenos apart, the chemicals expansion continued. In 2004 Orica acquired Bronson & Jacobs for $110 million, underlining the expansion plans under Broomhead and Gibson. Bronson & Jacobs had sales revenue of approximately $200 million and was a major supplier of raw materials to industry sectors, including food, cosmetics, industrial flavours, fragrances, and pharmaceutical and essential oils. It had operations in Australia, New Zealand, Hong Kong, China, Thailand, Indonesia, Malaysia, Singapore and the UK. The deal continued Orica's expansion of its food and fine chemicals distribution business, and made the company the market leader in food additives.

Then in November 2014 Orica CEO Ian Smith signalled a change of direction. He sold the non-mining chemical operations to Blackstone for $750 million, declaring in a press release, 'the successful completion of the sale of its Chemicals business marks the realisation of its strategy to become a pure play mining services company.

'Orica will focus on growing its position as the world's leading supplier of blasting products and services to benefit customers in the mining, quarrying and construction sectors in over 100 countries,' he added.

The sale included Orica's chemicals trading businesses in Australia, New Zealand and Latin America, the Australian chlor-alkali manufacturing business, and Bronson & Jacobs. Blackstone onsold the business, known as Ixom, which was then earning around $133 million, to Singapore-based Keppel Infrastructure in 2018 for around $1 billion.

Mining chemicals is a growing part of the Orica product range as the company matches customer needs for future-facing metals such as copper, nickel and lithium.

Among mining chemicals, cyanide is primarily used for leaching purposes in the gold industry. The product comes under the control of Jakarta-based Adam Hall, who

Inspection of mining chemicals at Deer Park, Australia.

joined the company in 2019 after long stints with CF Industries and Bunge; he also serves as head of the Asian operations.

Overall the company earns 5 per cent of revenues from mining chemicals compared to 35 per cent for bulk emulsions and 22 per cent from ammonium nitrate. Its sodium cyanide base is in Yarwun, Queensland, with 40 sparge installations around the world, including transfer stations in Ghana and Peru. Sparge is the Orica-designed method of transporting cyanide safely and is packaged according to customer needs. Emulsifiers are still made at Deer Park.

Chief executive Sanjeev Gandhi has made clear his 'ambition is to get access to a portfolio of mining chemicals that help in the extraction and purification of future-facing commodities', as he told the media at an industry lunch in June 2023. 'There's a lot of chemistry that goes into copper purification, nickel purification, lithium … to convert ore into usable product is all chemistry. And that chemistry is what I'm really looking for in terms of growing my portfolio.'

This suggests mining chemicals will continue to be key to Orica's future.


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9 | Dulux and beyond

In 1984 Doug Curlewis took the reins at ICI Australia's Dulux from his old Sydney Shore School colleague, Warren Haynes, who eight years later was to become chief executive of ICI Australia before suddenly dying in 1997. Haynes's death came just as the company's British parent was selling its 62 per cent stake in ICI Australia. It also came just as Haynes was rejecting attempts by then Dulux International chief Peter Kirby to take the Australian division under London's wing ahead of the sell-down. Kirby had earlier run Dulux Australia from 1989 to 1995 and built on Curlewis' legacy to turn the company into a highly profitable unit.

In the early 1980s, Dulux had made money only due to the success of its technical division and its sales to car repair shops. In fact, the technical division made more money than the earnings of the rest of Dulux combined.

Curlewis came from outside ICI, having learned his trade at Gillette, then tobacco company Philip Morris, which he ran before making a surprise career change and quitting in 1982 to teach management at Melbourne's Chisholm Institute. Milton Bridgland hired Curlewis from Chisholm.

Not long after Curlewis joined, Bridgland was replaced as chief executive in Australia by former ICI Canada boss Chris Hampson. Keeping an open mind, Hampson strove to change the culture at ICI Australia, wanting more marketing and commercial skills for the group—a change from the product and technical base that was more traditional ICI. He also had industrial relations reforms in his sights.

At Chisholm, the economists and management/marketing thought leaders Curlewis followed included Theodore Levitt, who taught the benefits of marketing through the differentiation of everything. Two others were McKinsey consultants Tom Peters and Bob Waterman, whose book *In Search of Excellence*, first published in 1982, was the corporate bible at the time. Their insights followed by Curlewis included 'customers are the individuals using the product, so they will have the best insight of the strengths and weaknesses of the product. Communicating with customers will help create loyalty between them and the company.'

Previous spread: Dulux head office in Clayton, Australia.

BALM Dulux truck, 1950s.

Curlewis worked with Kirby and key executive Gavin McLean to help drive Dulux to profitability. He had a manic focus on customer care and return on investment. In April 1995 Curlewis was quoted in the *Australian Financial Review* as saying, 'If a general manager can't show me how he plans to defend his lunch and eat the other bloke's, I wonder if that is a business we want to keep.'

Curlewis posted customer-service levels on a noticeboard outside the Dulux factory, where the ratings—initially in the low 40–50 per cent range—were gleefully photographed and hawked around by rival paint salespeople. But clients also noted the rivals were not even measuring their own score.

The rule of thumb at Dulux Australia was that London head office chose the chair, who as often as not was the head of ICI Australia, and Australia chose the managing director. Time at Dulux was considered part of the training for the top post at ICI Australia, as was the case with Bridgland, who ran the paint division from 1967 to 1971. Haynes also rose to the top of the parent company after a stint at Dulux, as did Michael Deeley and Graeme Liebelt.

The prevailing external wisdom at the time was that ICI Australia had first-rate people, governance and technology, but poor commercial skills. This view was also shared within head office in London.

BALM Dulux store, Wellington, New Zealand.

By the time Curlewis left Dulux, five years after his appointment, it was profitable on all fronts, thanks in part to his focus on the customer and a strategy 'to go open'. This strategy involved taking on his biggest customers, who were the then-growing hardware retail giants. Dulux's Paint n Paper retail stores were converted to Dulux Trade Centres, and the big hardware chains like Mitre 10 and BBC were targeted, along with a small Western Australia–based chain called Bunnings.

Not all of the hardware chains supported the strategy. But Dulux had a better time with Bunnings and the relationship was developed by both, so Curlewis later cut a deal that meant Bunnings was the sole outlet for the Dulux brand British Paints.

In some ways the close alignment with Bunnings meant Dulux grew with the retailer. The Bunnings brass, which included Gavin Bunning, Joe Boros and PJ Davis, worked closely with Dulux customer chief Greg Beatty and, after Curlewis went to Europe in 1989, his successor, Peter Kirby. Dulux worked with all the big retailers but, having looked at the international markets and the push into big-box retailing, management thought Bunnings was on the right track in following this model.

Up to the mid-1980s ICI Australia owned only 70 per cent of Dulux, but the company was useful as a management training ground. In 1986 ICI Australia acquired the

The explosives division dealt with a handful of big customers, but Dulux's customers ran into the thousands. This misfit was one reason why it was demerged from Orica in 2010 when it was successfully floated on the ASX.

remaining 30 per cent of Dulux, buying the UK-based Cookson's long-held position as one of the original British Australian Lead Manufacturers (BALM) shareholders. The commercial logic of the deal was clear, but at Dulux it was a mixed blessing because the minority shareholding was sometimes used as a shield against any unwanted head office interference.

When Curlewis joined Dulux, the company HQ was in a small building next to One Nicholson Street in the Melbourne CBD. Curlewis took it further afield, with the head office moving to Clayton where the main factory was based. This also brought Dulux top brass closer to their executives and, in the process, customers.

In spite of its assumed role as an ICI Australia management training ground, Dulux was always an odd fit with the rest of the company, particularly after the technical paints division was sold to PPG in 1998. After ICI Plc sold its stake in ICI Australia in 1997, several committees were established in a major review orchestrated by McKinsey Australia boss Adam Lewis to determine just what assets to keep and what to sell.

Patrick Houlihan, who had been with the company for ten years, was the Dulux representative and helped make the eventual decision to retain decorative paints and adjacencies such as Selleys and sell technical products to US-based giant PPG. The proceeds of this and other asset sales were ultimately used by the company to buy the ICI Plc explosives assets, which converted Orica into a global player.

Houlihan had been a notable success in the much-vaunted ICI/Dulux talent management program. He joined Dulux in the late 1980s as a research chemist, and in 1992 was transferred for a stint to Cleveland in the US with ICI-controlled Glidden paints.

Houlihan started his MBA studies with a view to staying with the research lab and technology management, but as he progressed through the course, he saw the chance for a career in general management. He did not take his eye off the research labs and was instrumental in hiring a colleague from his Cleveland days, Dr Brian Roulstone, who ran the Clayton labs for a decade.

The explosives division dealt with a handful of big customers, but Dulux's customers ran into the thousands. This misfit was one reason why it was de-merged from Orica in 2010 when it was successfully floated on the ASX.

ICI Australia acquired British Paints in 1988 for $130 million, which had the happy effect of ending a bitter price war in the Australian paint industry. Dulux boosted its

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market share to over 50 per cent. ICI Australia noted in its annual report that since the takeover, 'margins and profits have improved'.

Chris Hampson played a key role in the purchase. He had joined Kirby and McLean before a Dulux board meeting when the discussion turned to British Paints' role as a price-undercutting maverick and how life would be easier without it. Hampson made the very welcome suggestion 'maybe we should buy the business', which was quickly endorsed by the Dulux team.

The takeover had benefits, notably the transfer of the Selleys franchise.

Martin Sally fled Nazi Germany before the outbreak of World War II and emigrated to Australia with his wife and young son in 1939, along with a patented formula for putty and £100 in his pocket. After changing his name to Selley, he established the Selley's Chemical Manufacturing Co., producing glazing putty.

He branched out into other products whenever he saw an opening. For example, the immediate post-war period saw a shortage of aluminium, which led to a drop in production of kitchen utensils. Selley responded by inventing a metallic cement for mending pots and pans. Other products followed. Soon, the phrase 'If it's Selleys, it works' was coined, eventually becoming the tagline for the company. Selley sold the company to British Paints in 1963.

When Curlewis took the job of running Dulux in Europe in 1989 he was replaced by another import, but this time someone from inside the family. Peter Kirby, the former head of ICI Dulux in South Africa, took on the job and successfully expanded the division before being prompted to run Dulux globally in 1995.

The British Paints acquisition gave Kirby an open licence to rationalise the business, shutting down excess plant and thereby driving profitability.

Kirby took the Curlewis focus on customers further by pushing his executives to randomly call customers to check on service levels. This in turn drove the message home to executives down the line that their service was being watched.

In the latter part of his time in charge, Kirby was given carriage of ICI Plc's Asian operations, which were overdue for restructuring. His success in this role soon landed him the post of Dulux International chief, based in London.

In his time running the business, the Australian operations doubled and Asia-Pacific earnings jumped by 50 per cent, making it the most profitable ICI paints division globally, earning more than the European and American operations combined.

BALM high-grade paint promotional material, 1955.

Asia was boosted by a $200 million capital expenditure program, which added five new paint plants across the region, lifting the total to 12.

A string of divisional heads followed Kirby, including Peter Bailey, until Patrick Houlihan was appointed chief in 2007, a position he still holds under Nippon Paint ownership. Houlihan credits Curlewis, Kirby and Bailey for making the cultural changes that led to profitable growth in paint and associated products. In Dulux's nine years as an independent company on the ASX, its returns were in the top 5 per cent. In four years under Nippon Paint ownership, it has doubled in size through expansion into Europe and Asia.

Houlihan's rise was a classic example of the ICI Australia career path—starting in the research lab, then making his way into management, and now running the company.

This global pre-eminence was in sharp contrast to the early days. In 1914 the federal government's Inter-State Commission, the body in charge of administering interstate trade, recommended that the raw materials for paint could enter Australia duty free. But this didn't help the makers of the paints. At that time, the master painters tended to mix their own from white lead, linseed oil, turpentine and staining colours, all imported from Britain. The tariff changes meant the painters got cheaper ingredients and had no incentive to buy mixed paint from local factories. When they did buy ready-mixed paints, they naturally preferred to buy the superior British product, spending huge amounts of money on imported paints and varnishes.

To compete, the Australian makers needed to make their own ingredients. White lead was the main ingredient and, happily, Australia was one of the world's largest producers of pig lead, so it should have been able to manufacture cheap white lead. Attempts at getting government support were tarnished by the growing evidence white

Sales of paint were increasing at a pace that white lead would never attain, and Port Adelaide was so profitable that BALM opened another plant near Cabarita in Sydney.

lead endangered health. When World War I broke out, white lead was still used extensively by the loss-making industry.

In 1917 Lewis Berger & Sons built a white lead factory on the Parramatta River in Sydney. The factory, backed by American giant Sherwin-Williams, prospered.

A year later, the British Australian Lead Manufacturers (BALM) company was formed, to produce white lead at a site at Port Adelaide, South Australia. Broken Hill Mines owned 38 per cent of the company. BALM soon ventured from lead into paints, the initiative of legendary BALM boss Henry Barncastle. The move surprised BALM's UK shareholders, but London also realised that unless the company copied Lewis Berger and made paints and varnishes, it could not compete in white lead alone. The competition could easily manipulate their price for one line and make up for it in others.

Sales of paint were increasing at a pace that white lead would never attain, and Port Adelaide was so profitable that BALM opened another plant near Cabarita in Sydney. The Port Adelaide plant was focused on the growing car industry, selling undercoats and finishing enamels to Holden in Adelaide and Ford in Geelong.

There were issues with the car paints, however, with cars tending to spot and fade after rain. As the company chemists worked through the issues, DuPont had launched its nitrocellulose lacquer (duco) in the US. This superior product left BALM stranded, so it sent a chemist to the US to work out the formula and he brought plant ideas to make a lacquer that would compete with duco.

ICI Plc and DuPont were at the same time planning a factory at Deer Park to make nitrocellulose cloths and lacquers. ICI Plc was wary about competing with BALM given its mining company shareholders. The Broken Hill mining companies that held more than one third of BALM were large buyers of Nobel explosives and had not shed their antagonism to the explosives monopoly.

If Deer Park made paints, Broken Hill might make explosives or at least buy them elsewhere. ICIANZ's Sir Lennon Raws concluded in 1927 it would be 'a great pity to create a position which might lead to acute competition between concerns which otherwise have interests in common as the Broken Hill companies and Nobel's have. I suggest the possibility of BALM and Nobel–DuPont co-operating in the lacquer business and so avoiding a cause of competition in paints.'

A flurry of action in London resulted in ICI Plc and DuPont acquiring a 40 per cent interest in BALM, handing over £88,282 and their lacquer trademarks. The two

Top: Dulux head office, Clayton, Australia.
Bottom: The English Sheepdog, synonymous with the Dulux brand.

Orica's Malcolm Broomhead with a range of Selleys products.

lead groups were still in control, but ICI's entry to the share register meant BALM became linked to the rest of the world, including the strong research centres at Slough in England and Wilmington in the US.

After the Depression, DuPont's lacquers gave BALM a break with its new product, Dulux. The name Dulux was, depending on who you talk to, a combination of DuPont and 'luxury' or of 'durable' and 'luxury'. Either way, in 1971 BALM changed its name to Dulux.

The advent of the new paint in the US transformed the industry, giving wood and metals a tough lustrous skin that was watertight and airtight, and its ability to dry quickly attracted the mass production industries. BALM made Dulux enamels in 1932 and began advertising widely. It did not rely completely on DuPont and acquired the rights of the American Chemical Paint Company.

World War II saw another boost to BALM's fortunes. The company became sole supplier of paints to the RAAF, in part using Aboriginal-mined ochre. White lead was replaced by titanium dioxide, a whiter and denser pigment made from black beach sands. The replacement of white lead as a key ingredient in paints put BALM into a different role, and the relationship between ICIANZ and DuPont strengthened.

ICIANZ owned 40.3 per cent of BALM and wanted more, given most of its success had come from the duco and Dulux lines transferred by ICI and the technical knowledge of ICI and DuPont.

Australia was also a centre for innovation. Such products as Dulux Wash & Wear and Weathershield and Selleys Liquid Nails and No More Gaps have Australian origins.

ICIANZ convinced Broken Hill that the logical link between lead and paint was going, and ICI won control in 1954 with 70 per cent ownership; the rest was owned by UK-based material technology group Cookson Plc.

In 1946 things came to a sudden halt when an anti-trust action in the US meant DuPont and ICI had to cease doing business and the two could no longer share technical information. But BALM crucially retained the right to the Dulux brand. There was now more reliance on the Australian research arm, which thankfully has since proved itself many times over.

Free access to information was one privilege BALM had hoped to win when it was controlled by ICIANZ, but that privilege disappeared and it had to rely more on the parent company and its own research.

Globally, ICI Plc and DuPont continued to do deals as the chemical industry consolidated. In 1997, the same year ICI sold its interests in ICI Australia, it also sold its industrial chemicals business to DuPont for $3 billion. The sale included ICI's polyester and intermediates interests and its titanium dioxide holdings outside of North America. The deal represented a major global expansion for DuPont. ICI retained its titanium dioxide business—used in paints and paper products—within North America.

For ICI London, the transaction completed its dramatic shift away from industrial chemicals to the more profitable consumer-oriented businesses. Like other ICI divisions, Dulux followed the model of importing the best of overseas technology and supporting and enhancing it with local research and development.

The Australian arm was also free to use marketing ideas from London, such as the old English sheepdog used in British Dulux advertisements in the 1960s; it debuted in Australia in 1976. The original dog, named Dash, quickly become synonymous with Dulux.

Australia was also a centre for innovation. Such products as Dulux Wash & Wear and Weathershield and Selleys Liquid Nails and No More Gaps have Australian origins.

ICI Plc was keen to keep Dulux when it sold its 62 per cent stake in what is now Orica, but it was a key earnings provider for the local company. When Orica floated Dulux in 2010 it was worth $800 million with a net profit of $70 million, which grew to $3.8 billion in value and $145 million in earnings on sale in 2019.

One Nicholson Street

When ICI Plc chair Sir Alexander Fleck opened ICI House on 11 December 1958, he was under no illusions about its importance. He told *The Age* newspaper, 'it's not simply a company event, it's an Australian achievement'.

The £3 million, 19-storey building was the tallest in Australia until 1961 and at 395 feet (120 metres) above sea level almost double the size of the next tallest building in the city. It was Melbourne's first glass-wall skyscraper at 84 metres tall, 40 metres above the previous height limits. The building's concrete-encased steel frame and sheer glazed curtain walls were an extraordinary statement at the time.

The inspiration for the curtain-walled prismatic forms was the 1952-built Lever House in New York City, by Skidmore, Owings & Merrill. The glazed curtainwall evolved from a series of buildings and projects in Europe by Walter Gropius and Ludwig Mies van der Rohe, and contrasted with the structural frame and fireproof cladding of other Melbourne buildings. Melbourne people saw it as the awakening of a modern city, adding an international touch to Australia. Such was the excitement that after it opened, 20,000 people paid to come and have a look.

Sir Alexander had a much grander vision in mind, making clear everyone understood this was a partnership with the UK's Imperial Chemical Company in Australia. 'At this stage it is clearly not within the power of Australian business to produce unaided because of the very large sums needed for development,' he said. 'Australia is rightly diversifying its activities so that it will not completely depend on its exports of wheat and wool, especially since those commodities may fluctuate violently in price ... The diversification must come from industry.'

Noting Australia's problems with water, he said when these issues were solved Australia 'would continue to attract the numbers needed to build up its population so the great surge that we are seeing now represents only a beginning'. These words highlighted both the vision the company had for this former colony and how ICI Plc was going to play a major part in its development.

From the outset of the fast-tracked construction process, ICI House was a critical and popular success. On the day of the official opening, *The Herald* reported that 'Probably no building has attracted as much attention since the 1879 Royal Exhibition Building'. Referencing the building's elevated site, architect Robin Boyd described ICI House as 'Melbourne's elegant top hat'.

Built by EA Watts and designed by Sir Walter Paul Osborn McCutcheon, from the firm Bates, Smart & McCutcheon, it was constructed on land first purchased in 1952 on the fringes of the CBD partly because the site offered better vehicle access than elsewhere.

The new building brought together ICI staff who had previously worked in seven different city office locations. Now 1000 ICI staff would be based in the one building.

ICI House incorporated the best technologies and amenities of the times. It had a telephone exchange for 800 lines and an air-conditioning system powered by a cold air unit that made 22 tons of ice each hour. The eight lifts could travel 500 feet in a minute, and there was a pool and a garden around the foyer and a canopy on the roof to make it more comfortable to eat sandwiches while taking in the view. The canteen on the top floor seated 400 people. The basement of the building had spots for 65 ICI cars and 15 visitor spots.

The gardens on the Nicholson Street and Albert Street frontages of the ICI building were designed by sculptor Gerald Lewers. The fountain in the gardens is regarded as Lewers' most ambitious and most successful fountain and is his only piece of public sculpture in Melbourne.

The building's height was an issue because the Melbourne City Council restricted building heights to no more than the reach of a fireman's ladder, which was just 132 feet (40 metres). McCutcheon successfully argued that in New York City, much bigger buildings had been built, with ceiling sprinklers used to compensate for the inability of fire ladders to reach high enough. The architect also listed a few buildings and structures that already exceeded the height limit of 132 feet, including the offices of the Police Headquarters building in Russell Street (150 feet, completed in 1940) and the Australian Building in Elizabeth Street (150 feet, completed in 1889).

In the end, the greater height was permitted because the council examined the planned building in terms of its coverage as a percentage of the total site area, not its height alone. The deal with the Melbourne City Council was that public space would be provided below the building

to compensate for its height. Another attraction for the council was a large increase in rates: the site attracted £363 in rates prior to 1958 and £21,250 after completion.

ICI House introduced new benchmarks for office space and rental prices in Melbourne. Quality office space was a matter of prestige, also expressed by floor plate shape, layout and size, as well as modern communal spaces. Maximising the opportunities given by a large, consolidated site, the slab had a plan of 190 feet by 54 feet, which provided a total area about twice the size of any other contemporary major office block in the city.

ICI House was a giant, not only in height but also for its typical floor area of 10,000 square feet. Its 180,000 square feet total floor space in a single building set new records.

In late 1958 a problem revealed itself. A window pane on the west facade suddenly shattered, followed, over time, by dozens of others. ICI's internal public relations director, Peter Ryan, later to become head of Melbourne University Press, had this to say about the situation, as quoted in his *Nation* newspaper column in John Tidey's book *Ryan's Luck*: 'The building seems recently to have developed snakelike tendencies, an inclination to shed its skin. Regrettably for passing pedestrians the skin is made of glass and so Nicholson Street is sometimes thickly showered with shining vitreous particles which may have fallen anything up to 250 feet.

'Melbourne's top hat therefore acquired a somewhat adventurous new stiff brim in the form of a solid timber canopy erected by ICI to protect the public. There were no casualties reported so far. So famous is the ICI building that despite the American presidential contest and other minor news, Melbourne morning newspapers both gave large front-page pictures to the building's tame strip tease.'

CSIRO research found the cause to be nickel salt impurities in the Belgian glass, which expanded and contracted in the sun. The company paid more than £50,000 to replace all of the windows on the western side.

The building served as ICI Australia's head office until 1998, when it became Orica's HQ. In 2005 it became the first building constructed after World War II to be added to the National Heritage List.

ICI Australia's head office in Melbourne, Australia, December 1958.

10 | An industry giant changes course

For most of its history, ICI Plc symbolised excellence at the heart of Britain's scientific and manufacturing base. Among its innovations were Perspex, the first man-made anti-malaria treatment, and beta-blockers for the treatment of heart problems.

ICIANZ seemed to be everywhere in the late 1960s and '70s, an era presided over by Sir Archibald (Archie) Glenn as chief executive from 1953 to 1971 and chair from 1963 to 1973. The company's promotional material at the time declared, 'ICI Australia is a group of diversified divisions and companies all playing vital roles in Australian life. Our products raise the standard of living, increase life expectancy and improve productivity. Through its Australian management, it has grown to be one of the nation's leading companies. ICI contributes to the pleasure of increasing leisure, easy care clothes, sails, ropes for yachting and unsinkable dinghies.'

Its drugs included important medicine to combat heart disease and Atromid's Inderal Fluothane, the world's most widely used anaesthetic. The same company produced Terylene, Dulux paints, Savlon antiseptics, UV sunscreen and rigid urethane foam. The company boasted, 'There are few sectors of the Australian community not served by ICI Australia', and it was right.

In the UK, Sir Denys Henderson, ICI Plc chair from 1987 to 1995, took the company to main street, making himself available for media interviews and being more open with the City, the financial centre of London. He started television advertising with the slogan 'ICI—World Class', stressing the company's international successes and in the process aiming to boost employee morale.

Sir Denys once opined to the UK *Guardian* newspaper in 2007, 'companies don't go on forever and a day; they must adapt to changing circumstances.' That had been made clear for all to see in 1993 when ICI Plc was split in two, with ICI retaining paints, explosives and chemicals, and a new company, Zeneca (which became AstraZeneca in 1999), housing the thriving pharmaceutical division. The split, which also involved job losses, formed a blueprint for company de-mergers globally and for what ultimately would happen with ICI Australia and its own divisions.

Previous spread: Researcher at work at ICI's Technology Centre, Kurri Kurri, Australia.

ICI employees, Australia.

Ten previous ICI chief executives had made their mark on the company by expanding into new products and sectors; now there was a chief making his mark by splitting up the empire. In 1997 ICI Plc sold 62.4 per cent of ICI Australia (ICIANZ changed its name in 1971), and the following year it sold Australia its global explosives business.

This move would effectively recreate a global explosives powerhouse, but not before Australia shed parts of its own operation, either in sync with ICI London—as with pharmaceuticals into Zeneca—or on its own timing as it focused more and more on explosives.

Sir Denys was both a global leader and a follower, as the global chemical giants had all moved into more specialised products.

In Australia, Incitec Pivot and Dulux (now Nippon Paint) were more demergers after the ICI split, and after a string of smaller asset sales and acquisitions the end result was the world's biggest mining services company, Orica. Ultimately, after 81 years, in June 2007, ICI Plc officially died, at least in name, when Netherlands-based Akzo Nobel acquired the slimmed-down paint and adhesives company for US$16.2 billion. Akzo, the owner of Crown Berger Paints, onsold the ICI adhesives and electronics materials business, National Starch, to German consumer group Henkel for US$5.5 billion. This helped recoup some funds for the acquisition to allay concerns it had paid too much for the paints business.

Research and testing at ICI's Technology Centre, Kurri Kurri, Australia.

The Akzo sale came almost ten years after ICI had sold its stake in ICI Australia and six years after corporate raider James Hanson (Lord Hanson) sent tremors through the company by buying over 2 per cent of ICI Plc. He threatened to do what the company eventually did itself, but on his own terms and benefiting his own pocket.

Little wonder that in 1997, when ICI Australia chief Philip Weickhardt went to London to discuss project plans with chair Charles Miller Smith, he was told in no uncertain terms there were other plans afoot and Australia was not on the top of the to-do list. Weickhardt took him through the proposal, after which, as Weickhardt told the author of this book, Miller Smith looked at him and declared, 'Phil, your plan is very attractive, but you have to understand, I don't get up each morning dreaming about getting bigger in Australia. We are already ten times overweight in Australia.'

This entrenched the view in Australia that London had its eyes elsewhere. Miller Smith, a former Unilever finance director, in fact had his eye on his old employer's specialty chemical business. ICI failed to launch the mooted bid for Glaxo, which would have cemented its place in the global pharmaceutical business.

In 1977 the company employed 130,000 people and had a market value of US$26.5 billion. By 2007, it employed just 26,000 and its market value had fallen to US$10.5 billion.

As often happens with companies when they flunk as a predator, they become the prey. ICI for much of its history was viewed abroad and at home as a quasi-arm of the British state. The company saw itself as having a duty to do what was good for Britain. According to a June 2007 article in *The Guardian*, 1961 chair Paul Chambers spoke to the era, saying, 'there is a public duty to go on making the essential basic chemicals even though the sales may appear to be less progressive and less profitable'. He offered a telling example. 'ICI could not withdraw from the production of industrial explosives without giving the Government and the public notice of this.'

In 1977 the company employed 130,000 people and had a market value of US$26.5 billion. By 2007, it employed just 26,000 and its market value had fallen to US$10.5 billion. ICI was viewed as the bellwether for British industry and its demise was seen in the same light.

The local treatment of ICI Australia was eerily similar and certainly something the company sought to exploit when it came to protecting its own interests or creating new opportunities.

In a paper critiquing the 1993 spin-out of the ICI pharmaceuticals division, Geoffrey Owen and Trevor Harrison in the *Harvard Business Review* in its March–April 1995 edition said the company 'was a classic example of a large diversified multinational corporation that by doing too many things had created a mismatch between its role as a corporate parent and the needs of its businesses'.

It noted that the Lord Hanson entry onto its share register was the ultimate indignity because it raised the view that the value of the business wasn't reflected in its stock price. ICI's problem wasn't an unusual one at the time. 'Changes in markets and technologies had overtaken the logic that held the component businesses together and bound them to the corporate parent. The parenting skills on which ICI's earlier success had been based were simply no longer appropriate.'

The article went on: 'Today, each of the two companies is a far better parent to its portion of the old ICI portfolio of businesses than the old corporation had been to the whole ... The rationale underlying the structure, composition, and expansion of the old ICI, like that of other leading international companies dominating the chemical industry since the 1930s, had been technology and vertical integration. Investment in

At the end of World War II, the chemical industry globally was essentially geographically split three ways, with ICI controlling the UK and its former empire, including Canada, Australia, South Africa and New Zealand; DuPont, the US and Latin America; and IG Farben continental Europe.

research and development traditionally ensured a continuing flow of new products. High-growth activities supplanted older businesses as they reached maturity. Huge chemical complexes grew up around very large plants, such as ethylene crackers, and ICI exploited each by-product stream to develop a new business.

'A McKinsey-influenced reorganisation in the 1960s attempted to clarify the relationships between the centre and the businesses. It also delegated more profit responsibility to the product divisions. But the large headquarters in London continued to provide central services and to exercise a coordinating role through an elaborate network of control groups and committees. The problem of complexity continued.'

ICI saw itself as a full-line chemical company, but it was increasingly clear there were not a lot of synergies between the component parts of the group, having an historical bias towards heavy chemicals, which were the heart of the founding companies back in 1926. The creation in 1957 of a pharmaceuticals division was recognition of the value being created, but it was not a high priority.

In the 1960s, globally, the chemical sector was an innovation hub, but by the 1970s the rate of new products had slowed. ICI had the technical lead in polyester fibre but failed to develop its early advantage. Instead, the company expanded its paint offering in 1986 through the purchase of US-based Glidden.

In 1997 Miller Smith spent US$7.5 billion buying the specialty chemicals division of his old employer. This deal left the company with a lot of debt and precipitated the sale of a string of assets, including ICI Australia.

At the end of World War II, the chemical industry globally was essentially geographically split three ways, with ICI controlling the UK and its former empire, including Canada, Australia, South Africa and New Zealand; DuPont, the US and Latin America; and IG Farben continental Europe. The three companies set their own prices and controlled their own destinies, never straying into each other's markets and essentially too big to do much else. With the benefit of hindsight ICI should have narrowed its focus earlier. But it had powerful divisional barons who were difficult to direct.

The 1980 recession wreaked further havoc, compounding the mass restructuring throughout the country as the slide in British manufacturing hastened. This was the era of Margaret Thatcher in the UK.

ICI had long had a consensual decision-making style that on some readings made it more inward-looking. In 1982 when Sir John Harvey-Jones took the chair at ICI, he was a rarity in not being a chemist by training and, as a former naval officer, not growing up in the company. His brief was to shake the place to its core, which he duly did, slashing costs by selling off low-margin businesses such as soda ash and cutting staff numbers by one third.

He saw his responsibilities as being to shareholders and staff while 'making a profit out of the markets where the market is'. This was a vastly different ethos to ICI's historical mantra of serving the interests of Britain.

Harvey-Jones maintained a belief in 'speed rather than direction', on the assumption that 'once travelling a company can veer towards the ultimate objective'. He cut non-profit-making and non-core businesses. He wanted to increase the motivation of those in the company who could say yes while cutting those who could say no.

He thought out of the box, doing deals such as a plastics asset swap with BP, taking its PVC assets for the ICI polyethylene business. This was significant: it was the first divestment of what had been a core product and one that ICI had invented.

His view was there are no bad workers, just bad leaders, and by 1984, just 30 months into the job, he had turned a loss maker into a company reporting a US$2.1 billion profit.

The commodity businesses, including plastics, fibres and industrial chemicals, were brought together in a new subsidiary, ICI Chemicals and Polymers, and were also reshaped through joint ventures, divestments and product swaps with other companies. But ICI was still complex and as the *Harvard Business Review* noted, it 'still carried the burden of a geographical and product diversity that was exceptional among the world's leading chemical companies'. It was a relic of a past era.

The demise of the UK manufacturing industry spelled trouble for ICI because it was its customer base. Cross-border mergers also meant that in sectors like cars, food processing and packaging, decisions were no longer made on a single-country basis, nor were they made any more in the UK. ICI strongholds in Europe and North America were no longer the drivers of global growth—that was now in Asia.

Still, no-one disputed the fact that Harvey-Jones was a breath of fresh air at ICI at a time it was engulfed with self-doubt caused by its collapsing markets. He was fond of saying, 'Planning is an unnatural process—it is much more fun to do something and if it fails it comes as a complete surprise, rather than being preceded by a period of worry and depression.'

Harvey-Jones was replaced in 1987 by his deputy Sir Denys Henderson, who took the unconventional thinking further by committing what some saw as outright heresy when he split ICI by spinning off the pharmaceuticals division. What had originally been the creation of four merged companies in 1926 was almost being cut to its pre-ICI origins.

Sir Denys later said the eyes of the previous chairs looked askance as he wandered down the directors' row. But his justification was simple: shareholder value. ICI's consensual management style meant change had to be sold down the line, not just at head office.

His changes were yet to capture the market and in the early 1990s the company was also faced with the need to raise more equity. The fault lines in the ICI structure were cracking open under the pressure of a new recession. With directors such as Ronnie Hampel urging more hands-on management structures and questioning the sprawling portfolio, Henderson established two reviews. Their verdict: concentrate on fewer business sectors, and only those where the company could be among the best in the world.

SG Warburg adviser John Mayo was brought in. The *Harvard Business Review* noted that Mayo concluded, 'the key to successful restructuring was recognizing a technological fault line within ICI. Pharmaceuticals and other bioscience-related activities fell to one side of the fault line; the traditional chemical businesses fell to the other ... The fault line divided two coherent groups of businesses that could be managed as separate companies'. Mayo later left Warburg to become Zeneca's first finance director.

The revolution was based on shaking the long-held belief within the company that being part of ICI was central. Management had always assumed that the company's businesses benefited from being part of ICI. The same held true of the historical relationship between ICI Australia and London.

This belief was in part well founded. According to the *Harvard Business Review*, 'The long-established network of overseas subsidiaries and associates gave members of the ICI family an international visibility and perceived clout they would not have enjoyed as independent companies. All companies had access to the same technology. Although divisions were responsible for their own research and development—the central research laboratory had closed in 1981—they drew on the same base of scientific knowledge, and fruitful collaboration was possible. Head office's responsibilities were to ensure that businesses identified and exploited these opportunities to the fullest'. The de-merger proponents were able to show that in the 'pharmaceutical division, most of the services provided by the head office were no longer relevant. The division handled its own sales and distribution in most countries because its products and customers had very little in common with other parts of ICI.'

The division had grown to the level where it did not need ICI and the technological links were tenuous. The exceptions were agricultural chemicals and the dye business where the links were important. 'Far more than other ICI businesses [these required] particular skills in handling national regulatory authorities,' concluded the *Harvard Business Review*. 'The cluster of bioscience businesses became Zeneca [and were split from ICI]. . . 'Most of the chemical businesses used large plants for high-volume production, and they had similar needs in chemical engineering and project management. In marketing, too, the difference between the chemical and bioscience businesses was clear.'

The split was a massive exercise. Some 2000 ICI employees in 120 countries were affected, and it involved 500 separate companies. Over a five-month period, 160 transactions took place in 60 different languages.

In the run-up to the split, the company raised US$2.7 billion in a rights issue, which established Zeneca and solved the need for an equity issue. At the time of the split the market was more enthusiastic about the new ICI than Zeneca due to doubts about its drug portfolio. Hindsight has allayed those fears.

ICI showed the role of head office was becoming less useful for the divisions in both financial control and strategic planning.

The 1993 de-merger was unveiled in July 1992 just after Lord Hanson had sold his shares in the company amid a massive ICI campaign against him, including claims he used company money to buy racehorses.

ICI showed the role of head office was becoming less useful for the divisions in both financial control and strategic planning. The two divisions had different needs, with pharmaceuticals more driven by research and new products, and chemicals less so. Chemicals were capital intensive and scale driven.

With the split reducing key management personnel in both divisions, it was no surprise when Ronnie Hampel stepped down and was replaced by an outsider for the first time in ICI history: former Unilever finance director Charles Miller Smith.

The demerger took more than a decade to complete and arguably this was in part because the pharmaceuticals division was initially not ready and in part because the obstacles to change within the company were enormous. Change also meant the company was now genuinely international, with three-quarters of its business and over half its employees outside Britain.

In the mid-1980s it was the first British company to post a £1 billion profit, and in 1989 it reached over US$3 billion. But that was the peak. New acquisitions, such as advanced materials, agrochemicals and seeds, were not fulfilling their promise.

Early on in his chairmanship, Sir Denys was criticised for being slow to sign up to the mantra of shareholder value. In the 1980s he did turn important, if belated, attention to ICI's patchy environmental performance and appointed a director responsible. The company was one of the first to issue an annual environmental report.

Since 1997 more than 50 of ICI's original businesses have been sold off. Many of its huge former operations in northwest and northeast England are now owned by other companies. It also cut its ties to the old Empire. The word 'Imperial' had outlived its usefulness.

11 | Chris Hampson and the new ICI Australia

Christopher Hampson was working for ICI in London in 1982 when Sir John Harvey-Jones took over the company and reorganised it rapidly. When former Australian chair and chief executive Milton Bridgland was preparing to step aside in 1984, Hampson was selected by Bridgland on, it seems, Sir John's advice.

A chemical engineer by training, Hampson started his career in Canada in 1954. He worked his way up the ranks before being transferred to the UK in 1978 to join the planning division, where he was part of the team that assessed growth opportunities. He returned to ICI's Canadian Industries Ltd (CIL) in 1982, reporting to its new president, Chuck Hantho. Touring the Canadian operations not long after this move, Harvey-Jones, who had met him in London, was impressed with Hampson, and the Canadian national took the Australian job on a 'non-returning ticket'. That meant ICI was under no obligation to pay for his return trip and his pension rights went with him.

While very much a global ICI insider, Hampson was considered the first outsider to run ICI Australia, and the appointment marked a desire in London, backed by the Australian board, for some changes in the empire. Hampson found ICI Australia to be a little old-fashioned. He brought a more entrepreneurial, customer-focused style to the company, but what impressed colleagues most was his open, personal style and his strong focus on safety.

Newcomers with a marketing bent were recruited, including David Gaffney from Quaker Oats in the UK, who in turn brought colleagues with him, including John Marshall, who ran specialty chemicals. The team were known in the company as the 'porridge boys'.

Gaffney, who joined ICI in 1985 and became an executive director in 1993, was sought out for his experience in fast-moving consumer goods. This was a long way from the chemists and engineers who had filled the executive ranks in the early years and for a company that had often placed its products and processes before actual sales.

The changes had already begun under Bridgland, who externally recruited Doug Curlewis, a former tobacco boss and academic, to head Dulux. Hampson's successor,

Previous spread: ICI operating centre, Australia.
Top: Regional plant workshop, December 1984.
Bottom: Specially designed trucks deliver ammonium nitrate blasting agents directly into bore holes.


ICI


ICI
ICI

Customer training session with John Beevers looking on.

Michael Deeley, summed up the views of many, saying he 'was a real people's person'; Hampson did not stand on ceremony. The new operating style was underlined in the eyes of many staff when he abolished the executive lift at head office, One Nicholson Street, which went express to level 17, the floor below the staff cafeteria on level 18. Until that day, only directors and senior executives had had access to the special lift.

Hampson was impressed by the talent in his executive ranks but wanted to open things up. The company had held its annual meetings in the board room in Nicholson Street and not surprisingly few outsiders turned up. Hampson not only held the meetings outside head office but used the company's quarterly reports as a chance to engage with staff. He found this was another gap in the company, with little dialogue between executives and the shop floor.

What started then was something of an internal revolution, with the company jumping to the forefront of industrial relations in Australia. This work was carried on by Deeley after Hampson's return to London. Both men earned considerable kudos from the Hawke government, which had been elected in 1983 just before Hampson's arrival.

Hampson said he felt the workforce deserved to know what was happening in the company. He started town hall meetings, open to all staff, at the nearby Royal Exhibition Building. The first was a little awkward because at first no-one wanted to ask a question until, as Hampson recalled, someone from accounts asked a tricky question, and having heard that asked and answered, it was open slather.

This level of communication was extended to customers, with Hampson personally paying a visit to the chief executive of every major client to express his gratitude for their custom. Elders IXL boss John Elliott told him he was the first senior ICI person to visit him.

Hampson figured such visits were an important bridge to better customer service, sending signals both internally and externally. 'I think it helped us become more customer oriented,' Hampson told the author.

Hampson backed executives in their dealings with the board, encouraging an open dialogue. Milton Bridgland stepped down and up when Hampson arrived in Australia, staying as chair but basing himself a couple of floors below his new chief executive. There was a three-month executive overlap to allow Hampson to settle in.

This proximity had the potential to cause tension, but Hampson said that, to his credit, Bridgland kept clear and apart from a couple of issues didn't intervene. One of these issues was Hampson's decision, without consulting the board, to scrap the legal department and instead use outside lawyers as required. Bridgland told him such moves should be subject to prior consultation with the board.

Hampson's strong belief was that the company's management and assets were very strong and just needed better direction. Early in his time, he gathered his executives at a strategy session at a hotel in Melbourne's Dandenong Ranges where it was decided to simplify the group structure, buying out the minorities and bringing the empire together. It was also decided to use the company's research excellence to extend into other product groups, including ceramics and building materials.

After his time in Australia and the passing of the baton in London to Sir Denys Henderson, there was a change in the relationship between the two companies. Hampson said in an interview this was more to do with a change in the parent company than any changes in Australia.

As described earlier, Sir Denys split ICI in 1993, spinning off its drug and speciality chemical business into Zeneca Group, which six years later merged with Swedish company Astra to become AstraZeneca.

At this time ICI took the unusual step of dispatching its former finance director Colin Short to be chair of ICI Australia. The move, it seems, was in part to take a closer look at the assets in Australia, and in 1995 Short handed over the reins to returning expat Ben Lochtenberg, who was chair until 2001. By the end of this time, ICI had sold out of Australia and sold its global explosives assets to Australia.

Safety was a major priority for Hampson, and many credit him for raising the issue company-wide, laying the foundations of the present focus. Hampson said, 'I put a big emphasis on safety from the start of my tenure, by holding meetings with the management at different locations to discuss how we could improve and ensuring that safety records were a key measurement of managerial performance. I did so not just to stop injuries, although that was key, but because the steps necessary to achieve

The company dabbled in computer software internationally, including a $10 million investment in Dendrite, a New Jersey–based software company specialising in the pharmaceuticals industry.

it—attention to detail, assessing procedures to eliminate hazards, etc.—went hand in hand with increased productivity and improved performance, and we did succeed in a marked improvement in our safety record'.

Hampson had the stature within ICI to change its antipodean offshoot. The internal focus was due in part to ICI's own demands, controlling what part of the empire could engage in what activities, but the aim was now more outward focused.

The company dabbled in computer software internationally, including a $10 million investment in Dendrite, a New Jersey–based software company specialising in the pharmaceuticals industry. Another innovation was creating a vertically integrated zirconia ceramics business, with plans to duplicate this in alumina and silicon nitride and silicon carbide ceramics. The ceramics work was based on pioneering CSIRO work.

ICI also looked at medical diagnostics, hiring Barbara Gibson from Amersham. Although the attempt to build a new division ultimately failed, Gibson went on to establish a highly successful executive career at the company.

The money spent on research and development aimed to leverage areas where Australia had a comparative advantage. As always, Australia was moving carefully to avoid overlap with ICI.

Michael Deeley replaced Hampson in 1987, having done his marketing apprenticeship in charge of Dulux from 1978 to 1981. If Hampson had been the new broom at ICI House in Melbourne, Deeley was well suited to maintaining and boosting the revolution. He stepped up the focus on employee relations, sometimes using blunt language to ensure everyone knew where they stood. Former HR executive John Wheeler remembers early in his time at the Dulux plant in Sydney's Cabarita in 1979 when Deeley, Dulux chief at the time, in his favourite Hush Puppies, told staff one morning, 'this is the worst performing Dulux factory in the world'. Not just Australia, the world!

Deeley focused on boosting the core competences. This included the landmark $130 million acquisition of rivals Berger and British Paints, and Selleys Chemicals, which cemented Dulux's domestic leadership in decorative paints. For Deeley, this was a further move towards consumer-oriented markets that would reduce the company's dependence on commodity chemicals.

Researcher at work at ICI's Technology Centre, Kurri Kurri, Australia.

In 1988 he bid for Adelaide-based FH Faulding, offering to pay $212 million for the pharmaceuticals concern, which would have significantly boosted ICI's market position. But the bid went nowhere, and in 2001 Faulding accepted a $1 billion bid from the acquisitive Peter Smedley at Mayne Nickless.

The company was prominent in the national economic debate. Deeley was a member of the Hawke government's Economic Planning Advisory Council. The new ICI Australia had established itself, extending its role as a major contributor to the economy and to the national debate.

12 | All change at Botany: The 1980s

The first operations at Sydney's Botany started in 1941, when a carbon bisulphide plant was established, followed two years later by caustic soda and chlorine. In the decades that followed, technology changed what was produced but the culture stayed much the same.

The site wasn't far from the British migrant hostel in Matraville, and in the early years most workers one way or another had ties to the hostel and Britain. It was hard to get to the plant by public transport and, together with the shiftwork and the sometimes dirty working conditions, it was hard to attract labour, and from the outset ICI tended to pay above award rates.

The British-style industrial culture was built around control, and the divide between management and workers was clear. The foremen were stuck in the middle, expected by the workers to be on their side and likewise by management to be on theirs. It was a tough job. Foremen were generally selected for their technical expertise and plant knowledge, which meant they could keep things going during a stop-work. They were, accordingly, detested as scabs or class traitors by the workers.

This culture changed dramatically in the 1980s. The petrochemical industry globally tended to run in six-year cycles and in the late 1980s it was at the top of the cycle, or in the words of one ICI manager, 'we have money coming out of our ears'. On paper, this was not an ideal backdrop for industry change, but the global industry was also changing, and ICI Australia was confronted by the growing reality that it was no longer competitive.

Just to ram the message home, in October 1986 the Industry Minister, John Button, unveiled his new policy for the chemicals and plastics industry. Basically, import tariffs would be phased down from as high as 45 per cent for products such as high-density polyethylene to as low as zero for caustic soda. The global chemical industry was restructuring away from bulk to specialty chemicals, as was ICI Australia's London parent, but the tariff cuts were more severe than expected.

Chris Hampson, ICI Australia boss at the time, was outspoken in the press protesting the plans. 'These savage cuts for products made in Australia go far beyond those

Previous spread: Aerial view of Botany site in Australia.

Orica Yarwun manufacturing centre in Gladstone, Australia.

recommended by the Industries Assistance Commission,' he said. But the reality was there were countless more consumers who would benefit. It was also clear a more limited future for the Australian chemical industry loomed.

The government decision had on some readings blindsided the company, which went into the Industries Assistance Commission talking up the importance of the industry to the country and manufacturing industry. But the government had different views.

Conversely, BTR Nylex chief Alan Jackson told the press raw materials were 35 to 45 per cent of his costs, so cheaper inputs were good news. ICI Australia was confronting the new reality in the 1980s.

With tariff duties slashed, the company changed its focus to anti-dumping actions. Dumping occurs if a company exports a product at a price lower than the normal value in the country of origin. ICI Australia became a litigious and frequent complainant about allegedly unfair imports and, along with the BHP steel division, was the biggest customer of the Australian Customs anti-dumping section. The company hired a former Customs officer, Bruce McCallum, to lead its charge against import competition through dumping claims.

Over the years the company had looked at building a world-scale petrochemical plant in Australia. The old armaments site at Point Wilson near Geelong was one site examined in the 1970s, and another was Redcliff near the Cooper Basin in South Australia. Both failed to reach ground zero for two common reasons: the lack of cheap gas and the lack of government support. ICI Australia kept looking for alternatives, including plans for a plant in Malaysia, which met with a brick wall at head office in London.

Chemicals and plastics had become commodity businesses. Chris Hampson tried different products—advanced ceramics, superglue and other building products—all aimed at building a competitive advantage, but ultimately all failed.

The company, like its parent, had long revelled in the fact its products were used by every Australian almost daily, sometimes without the customer knowing who was behind them. These included pharmaceuticals from UV sunscreen to Savlon, breast cancer drugs, nylon polymer, polyester and dyes used by the car industry, transport, defence and in everyday clothes, rural chemicals, plastics such as ethylene used for PVC polymer, chlorine for water treatment, soda ash, sodium silicates, phosphoric acid, and the list goes on. Many of these products were made in Botany. The company's value to the Australian community was seen internally as a given, but political support did not match the company's own perceptions.

The chemical industry accounted for 20 per cent of manufacturing industry research and 80 per cent of the value-add. This was a justifiably proud heritage for the company.

Hampson told shareholders on his arrival in the mid-1980s, 'ICI aims to be a successful Australian-based company satisfying customer needs in Australia and elsewhere primarily through the application of science and technology.' But imports were the new reality and ICI could not compete.

Being new to the game, after starting his career with Telecom (now Telstra), former ICI HR executive John Wheeler said he was amazed at the number of people 'leaning on shovels', 'and not just workers, this was at management level as well'.

Hampson's HR chief, Bruce Rowe, in his 1992 Foenander Lecture at the University of Melbourne said, 'the challenge for Australian organisations is to become world competitive. The challenge is to lower overall supplier costs to our customers'. Rowe was outlining the cultural upheaval underway in ICI Australia. Enterprise agreements are, he said, 'really only an outcome of the process. The change is from a controlling work mindset to one where people are committed to the task.'

Botany is the focus of this chapter, but culture change was a company-wide project and needed to be. In any case, folk at Botany throughout the history of ICI Australia tended to see themselves as the focal point of the company as its biggest single plant, accounting for 30 per cent of earnings in the good years and 30 per cent of assets. It attracted the nickname 'Fortress Botany'.

In John Wheeler's time at the company, he moved from Dulux in Sydney to Osborne in South Australia at the soda ash production plant, and after a stint in Melbourne, to Botany. Osborne, he said, had some ancient traditions, like the fact every tradie, be it a plumber or electrician, had a 'TA', a tradie assistant. That tradition was dispensed with.

ICI pre-1984 was very much a technical product-oriented company; Hampson changed this operating model for it to become much more customer-focused. Every ICI employee went through a telephone-answering course where they were told to emphasise service and to treat each caller like a customer.

The need for change was made clear by the slump in return on funds from 16.3 per cent in 1979 to 3.8 per cent in 1983. Hampson gave divisional managers more power, with a general principle that mistakes were fine: the first one was allowed, the second wasn't celebrated.

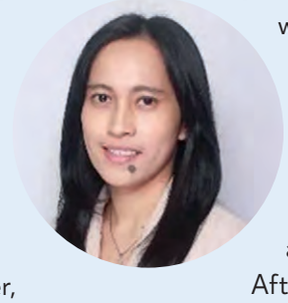
Industrial chemicals, which with annual sales of $350 million accounted for 17 per cent of group sales, was run by Bryan Smith. The Osborne facility in South Australia had suffered a significant setback when ACI Glass, a major customer, stopped buying soda ash and instead imported its needs. Smith gave the workers an ultimatum: be more efficient or the plant will close. The division's performance improved and in January 1987 Smith moved to run plastics and olefins and he was replaced by Tony Rogers. Rogers had joined the company in 1963 and worked his way up to become the national sales manager in the plastics group before being appointed general manager of the industrial chemicals group in 1987.

At this time there was also change at the helm, with Hampson being transferred back to London where he was appointed to the board. He was replaced in Australia by Michael Deeley, who had joined the company in 1963 in the synthetic yarn subsidiary, Fibremakers, before being transferred to head office in 1973 where he worked in a series of marketing, planning and development roles.

Mercy Elizabeth: Scholarship awardee to territory manager

Meet Territory Manager, Mercy Elizabeth, from Orica's Manila office in the Philippines.

Mercy's journey with Orica began as a scholarship awardee, and upon graduating from college in 2013, she embraced the role of Technical Services Engineer at one of Orica's Indonesian sites. During a time when not many women were directly involved in mining operations, Mercy defied norms and excelled in her role.



Throughout her career at Orica, Mercy has accumulated experience spanning operational, technical and commercial domains. She has spent three years as a graduate engineer, two years as a blasting engineer, two years as a business analyst and two years as a business development lead. When the opportunity arose to elevate her career, Mercy embraced the chance to become a territory manager.

'I was fortunate enough to be awarded an Orica scholarship during my time in university and joined Orica right after I graduated as a mining engineer. I worked as an Operation Engineer at first and then moved to the Technical Services team as Blasting Engineer for our Indonesia Coal and Metals operations and when the opportunity came, I made the move to the commercial team as Business Analyst and now lead our Business Development and Commercial team in Indonesia.

'At Orica I've had the chance to work in diverse environments and it's important that everyone I work with feels safe, accepted and valued and has an equal opportunity to grow and succeed. I believe that diversity will bring broader ideas and new perspectives to the table.'

As Mercy moved into a more business-focused role, the focus has shifted to customers and enhancing long-term value with stakeholders. After almost eleven years, Mercy is still passionate about her job, as the challenges and dynamics change every day.

'After nearly eleven years, my enthusiasm remains intact as the daily challenges and dynamics of the job consistently vary. The fact that Orica has almost 3,000 distinctive blasting locations makes this profession thrilling. Reflecting on the past decade, time seems to have flown by, and even my mom was pleasantly surprised to discover that the industry isn't as intimidating as she initially thought.'

Scientist at work at ICI's Technology Park, Australia.

Both he and Rogers stepped up the pace of restructuring. For example, Botany had three divisional managers, which was cut to one. Jesse Moore was appointed to the post.

All the changes came with job losses. Three hundred and fifty staff—26 per cent of the workforce—were made redundant, saving the company $12 million a year. It was a tough period, but the key was to explain what was happening so the workers knew what to expect. In 1986, the company served a Green Paper on the Botany workforce explaining the many changes expected. The reaction was mainly negative.

The head office plan was textbook clear, laying down its vision of what it was trying to achieve. The aim was to build a bridge based on trust and commitment, and this needed decisive leadership to give staff a clear message.

The reality was that the plan came not only with job cuts, but remuneration would change dramatically. Although many workers at Botany received a base pay, overtime was the ticket most lived on. This was scrapped in favour of salaries for the entire workforce from top to bottom. The focus then changed from how many hours you worked to what sort of job you did.

Higher skill levels also attracted higher salaries, so workers saw the benefit of lifting their skill levels. The company offered training programs to match the demand. This was one of Australia's first enterprise agreements with pay linked to operator skills. As Bruce Rowe explained, 'once you believe in unleashing the talent of all employees and giving them an opportunity to build and use their skills, the concept of a career for all employees begins to be a reality. Flexibility is added to the workforce, who are now ready to work outside traditional job boundaries. The bottom line is for management to ensure they deserve the trust of the employees.'

In 1988 the decision was made to take on the unions, with the knowledge it would lead to a protracted strike. Wheeler took the case to the board, which backed the move, but the decision was not unanimous.

The greenfield chlorine/sodium cyanide plant at Yarwun, Queensland, was a case in point, with one union, one super fund, one medical benefit scheme and no time clock. It was commissioned without a hitch in July 1989.

These workforce changes also affected management. Some managers were unable or unwilling to adapt to the new reality, and had to move on.

In 1988 the decision was made to take on the unions, with the knowledge it would lead to a protracted strike. Wheeler took the case to the board, which backed the move, but the decision was not unanimous. Many thought change was all too hard, which underlined the tension involved. Deeley backed Rogers, Wheeler and Moore in what was a high-profile industrial dispute.

By day seven, the strike had become highly political, in part because Sydney's chlorine supplies were running low, with the potential to affect the city's water supply. By day eight, Wheeler saw the tension erupt on the picket line in the form of physical fights, which gave him some confidence settlement was near.

The next day Rogers was felled temporarily with a bad cold and Wheeler rang early to say he was stepping up his campaign, which worried his divisional manager. Rogers urged caution but Wheeler laughed it off, saying, 'don't worry, they are walking to the office ready to sign the agreement'.

He was right. The Botany site, which for its first 50 years was the epitome of the adversarial industrial relations climate, was now a model for Australian industrial relations management. For ICI Australia this was a crucial result.

Ultimately, more structural changes took place elsewhere, but Rowe in his Foenander paper outlined the results of the new HR system, based on the regular three-year maintenance shutdowns at the olefins cracker at Botany.

In 1989, to complete the job, it needed 176,000 man-hours against a budgeted 119,000 hours, and took 45 days against the expected 35 days and was $5 million over budget. There were eight medically treated injuries and 309 first-aid cases.

In 1992 it took 136,000 man-hours against the expected 147,000 hours, 32.5 days and was under budget by $1.4 million. There was just one medically treated injury and ten first-aid cases. Overall costs came in 20 per cent lower under the new HR system.

Despite its national leadership the company underperformed on the stock market. In January 1990 in an *Australian Financial Review* article, analyst Graeme Adamson highlighted the complexity.

'The group is national leader in many of its activities—paints and coatings, industrial chemicals, explosives and fertilisers. These are sectors which also contain their share of those elusive high-quality smaller companies with impeccable several-year records of growth—Australian Chemicals, Gibson Chemicals, Wattyl.

'Yet ICI for all its leader status has not always been ranked in that category in the sharemarket. That is reflected in the current earnings multiple of 9.8 times which compares with the All Industrials Average—11.6.

'Perhaps ICI's market recognition is complicated by the sheer difficulty of understanding such a large and complex organisation with many intertwined activities.'

Adamson noted that in 1989 ICI had begun a $340 million capital expenditure program, which was a recurring imperative for a company with a desire to be internationally competitive. 'The major single programme was $100 million on a linear low-density polythene plant late in 1991. This will be part of the huge chemicals-plastics complex at Botany and will produce about 90,000 tonnes a year to replace imports now around 25,000 tonnes, with exports taking up the gap.'

He added, 'import competition intensified [in 1989] with the unexpected continuing strength of the Australian dollar. Then, in the September half, the world's plastics market, as expected, began to weaken as demand declined with some resultant overproduction and price cutting in the northern hemisphere'.

Meet Dr Ruilin Yang: Principal Research Fellow

Dr Ruilin Yang joined Orica in 1993 as a scientist at the ICI Canada Technology Center in McMasterville, Quebec. Currently based in Denver, Colorado, he holds the leading technical position at Orica and is a key member of the Research and Innovations team focused on transforming blasting technologies.

With a unique ability to balance his time between research and practical field applications, Dr Yang spends half his time developing new technologies, and the other half taking them into the field to implement and validate, and to generate value for Orica's customers.

He has been involved in several groundbreaking projects at Orica. He invented (or 'is the author of') the Multiple Seed Waveform (MSW) blast vibration model, the multiple blasthole fragmentation model, and the other modelling of blasts for real blast design in the field.

Dr Yang believes that innovation and technology are what makes Orica stand out. He has developed a modelling approach that uses easy measurable parameters in field blasting. Models that can simulate the full blast design parameters of a real blast design, and blast optimisations.

The MSW blast vibration model is used to predict blast vibrations at highwalls from nearby blasts. For open pit mining this is important, as it helps to prevent major safety hazards and disruptions to operations for the customer.

In 2021, Dr Yang was recognised by the Canadian Academy of Engineering for his impactful work and research in the field of explosives technologies, work that has greatly improved the safety, productivity and environmental impact of mines globally.

The newly popular specialty chemicals, such as detergents, brake fluids and automotive coolants, also grew strongly, with revenue doubling in three years. But import competition was constant.

Plastics had been the largest source of ICI Australia's profit in the late 1980s and the key target for new capital expenditure. On top of access to the research of ICI London, where expenditure at the time was more than $1 billion a year, the company lifted its own research and development outlay from $43 million to $60 million in 1989. Sales of industrial chemicals were continuing on a steady growth path in 1989.

The newly popular specialty chemicals, such as detergents, brake fluids and automotive coolants, also grew strongly, with revenue doubling in three years. But import competition was constant. Management realised that ICI Australia's plants were simply too small to compete globally, and US-based Huntsman started mopping up unwanted assets such as polyurethane.

In 2014 Blackstone emerged to buy chemicals for $750 million as Orica became a pure mining services company. The sale included Orica's chemicals trading businesses in Australia, New Zealand and Latin America, the Australian chlor-alkali manufacturing business, and Bronson & Jacobs, which is a supplier to the food and nutrition, and health and personal care industries in Australia, New Zealand and Asia.

Plastics went into a joint venture with ExxonMobil, which maintains the link to Botany and includes products like ethylene for detergent and polythene, akathene for low-density polythene such as garbage bags and drink cartons, and Alkatuff for high-density polythene.

Known now as Qenos Pty Ltd, it was established in 1999, taking over the plants and people of Kemcor Australia (Mobil) and Orica Polythene. It inherited the groundbreaking ethane pipeline ICI Australia had established to bring gas from the Cooper Basin to Botany. Ethane is a by-product of natural gas and an essential and low-cost raw material used in the production of polyethylene, which in turn is used to manufacture plastic. The pipeline was built between 1994 and 1996 by the Commonwealth Pipeline Authority under a contract with ICI Australia. It was then rented by Qenos.

Orica finally sold its stake in the company in 2005 to China National after writing down the $123.2 million valuation on the asset. Qenos now boasts that it's the cornerstone of Australia's plastics and rubber industry—exactly what ICI used to say.

13 | Orica's core: Explosives

Explosives are the core of Orica today, as they have been for much of its and its predecessors' history. But as the listed company ICI Australia, it wasn't until 1994 that they were separated out as a standalone division, having more recently been combined with Dulux and pharmaceuticals as 'consumer and effects'.

Explosives may have been the reason for ICI's establishment in Australia in the Victorian gold rush, but the vision in Australia had broadened with London's changes and explosives were not always central. The belated recognition of the division as the primary asset tells you something about how the company viewed itself and how the focus of the board and senior management extended into chemicals and plastics and just about everything else. The company had long promoted itself as playing a vital role in Australian life, 'contributing to the pleasure of everyday living', according to one ICI Australia advertisement.

For a young mining engineer graduate, John Beevers, who started at ICI Australia in 1985 as a marketing graduate in the Moranbah plant, the focus was more single-minded: just being attracted to blowing things up. Moranbah is in the middle of coal country in central Queensland. This was the beginning of a 31-year career at the company that took Beevers to three continents and most parts of the ICI empire, serving as head of chemical services, quarry and construction, global technology and mining services.

Beevers made his name in the company a decade later when running the quarry and construction division. It was losing money and Beevers' solution was to change its emphasis from recommending customers approach a problem by using small blasts to recommending bigger blasts, which were cheaper for the customer and, happily, more profitable for the supplier, ICI Australia. If you were making bigger explosions, you had to make sure they were the right ones in the right place, but site visits were fewer because the number of blasts were less. Customers loved this approach because it was cheaper for them; it was also cheaper for ICI Australia to deliver the services.

Peter Clinch, Beevers' one-time boss, started with ICI Australia some 20 years earlier, in Botany. The civil engineering graduate from Sydney University had joined the company to get some business experience, with the aim of going out on his own.

Starting at ICI Australia in 1985, John Beevers worked for Orica for 31 years, serving as head of chemical services, quarry and construction, global technology and mining services and today, as a Non Executive Director at Orica.

Previous spread: An operator loads explosives in an underground operation.

An underground mobile charging unit (MCU™).

That didn't happen because, as with Beevers, the opportunities kept arising as he moved from Botany to head office at One Nicholson Street, before doing the rounds, including importing plastics and organic chemicals and, from 1984 under Chris Hampson, running new businesses.

Hampson, in the late 1980s, wanted to take ICI Australia into new industries, including building materials, scientific instruments and ceramics, to move the company away from plastics and chemicals, which globally had moved to mass scale, way beyond Australia's reach. Michael Deeley, who took over from Hampson in 1987, maintained the search with a range of partners, including the CSIRO, and notably stepped up the company's industrial relations focus.

In essence, this took the legendary ICI personnel policies to the shop floor to open the door for workers up and down the line to broaden their careers. Chief Executive Deeley asked Clinch to run the explosives operations in 1987. The division had some problems because previous boss Don Pike had, in the view of some, lost control of the ammonium nitrate market.

The mining companies, led by BHP, had argued with some justification that ICI Australia was charging Wesfarmers too much for ammonium nitrate, and Wesfarmers

The explosives market is essentially divided into three parts: ammonium nitrate; high-quality initiating systems; and on-site capability to plan the explosions.

wanted a bigger share of the profits on the sale to resources companies. In 1987 Wesfarmers found a ready alternative, which ironically enough was Dyno Nobel. The Dyno joint venture with Wesfarmers presented a growing threat to ICI Australia, given the expansion of the Western Australian resources market.

Clinch reached a deal with Dyno to swap sources of ammonium nitrate. Dyno would buy it from ICI Australia on the east coast and ICI could then acquire it from Dyno on the west coast. Clinch had stopped the immediate threat of an expanding Dyno by reaching a deal with the competitor to share ammonium nitrate supplies. Happily, freight costs on the east-to-west train were significantly higher than those running in the other direction, so ICI did significantly better on the deal. The Dyno deal was done on a tonne per tonne basis, so each tonne used by ICI in the west was matched on the east coast and any extra tonnes were done on separate deals.

Wesfarmers later investigated plans to establish an ammonium nitrate plant in Queensland, a long way from its WA base. Given Wesfarmers had previously walked from explosives, the commercial moves interstate were seen more as attempts to put pressure on the ICI Australia share price to make a takeover bid cheaper. It had also worked with DuPont until the chemical major eventually sold its explosives business to Dyno in 2006. Ultimately, Wesfarmers didn't proceed with the Queensland plant.

Clinch moved the explosives head office to Chatswood in Sydney to be closer to customers who were based in the Hunter Valley. This also meant an escape from Melbourne head office scrutiny.

A decade earlier, in 1975, ICI Australia had abandoned plans to build a massive petrochemical plant at Redcliff, north of Point Pirie in South Australia, tapping into gas supplies from the neighbouring Cooper Basin. Costs had blown out to over $1 billion to build the plant and the partners, including Alcoa and Mitsubishi, decided it was too expensive. Once again the basic problem confronting ICI was a massive capital investment for the small Australian population base.

The explosives market is essentially divided into three parts: ammonium nitrate; high-quality initiating systems; and on-site capability to plan the explosions. ICI Australia had strength in all three sectors, and in the late 1980s gained significant leverage when ICI Plc allowed it to expand further into Asia. Australia had always served New Zealand, Papua New Guinea and the Pacific, but now the Asian market was open.

Traditionally, under the famed covenant that detailed commercial arrangements between ICI Australia and its parent company, ICI Australia was allowed to export

A blast at a mine site is initiated.

to wherever it was commercially feasible but was limited in its ability to invest in markets already supplied by ICI. In turn, ICI often assigned management of its Pacific assets to ICI Australia. Overlap disputes sometimes occurred, but for the explosives division the door was now wide open, a key breakthrough. ICI Australia took charge of the Asian market.

Clinch, as divisional head, led the expansion into the Asia-Pacific region—specifically Thailand, Singapore, Taiwan, and detonators in China. The historic China deal came under Philip Weickhardt's leadership when ICI Australia became the first international explosives company on mainland China, with a $20 million joint venture in Weihai in 1998.

ICI Australia's Asian explosives operations involved assembling components and materials either from Australia or third countries. The company initially had plants in the Philippines, Hong Kong and Vietnam. It also expanded, building plants in Malaysia and in Indonesia. The ventures further exposed the Australian explosives plants to indirect foreign competition, especially from US and Korean rivals, whereas in Australia they had a 10–15 per cent natural advantage over landed imports.

It was not all plain sailing in Asia. Nevertheless, the progress there helped underline the perception in London that Australia was the jewel in the explosives crown.

The Asian expansion was important because in the 1980s and '90s explosives became less important to ICI Plc. Its boss, Charles Miller Smith, for one, had his focus on specialty chemicals.

Peter Clinch told the *Australian Financial Review*'s Ian Porter in November 1998, 'explosives is a tough business, it is very complex, very technically demanding and logistically difficult but if you get it right it can make you a lot of money'. Clinch compared the business to a three-legged stool, the legs being cheap ammonium nitrate, a high-tech detonating system and good distribution.

While explosives was a small part of the company in the UK, approval was given for international explosives boss Bob Clark to buy Atlas Powder from Tyler Corp in the US in 1989 for US$193 million. The Texas-based business was seen at the time as being a handy geographical boost for the then Toronto-based ICI North American explosives arm. But the purchase of the loss-making operation quickly ran into problems.

The next year the US Federal Trade Commission (FTC) forced the sale of some assets and banned the company from any further explosives deals in the next decade without prior approval. The FTC alleged the acquisition meant that competition between Atlas and ICI Australia in the sale of electric blasting caps had been eliminated, barriers to entry into the explosives market would be increased, and the effectiveness of competition by small concerns would be diminished.

At around this time, Clinch was appointed to the local ICI board as an executive director and shifted base back to Melbourne before being summoned to London to run the international explosives operation. His move was part of London's efforts to stabilise the explosives business and followed some senior management changes.

The job had its challenges. There were heavy losses in India and the UK. Market share and profits were falling in South Africa, where ICI Plc held 51 per cent of AECI Ltd. While Canada was performing well, the US operation was a mess, with bad

Top: Operators in an underground mine.
Bottom: Team members at the Orica Philippines office.


ORICA

Mobile manufacturing unit reloading, Queensland, Australia, 1995.

operating results and huge litigation problems stemming from price-fixing actions dating to before ICI Plc bought it in 1990.

An even bigger problem hit in 1995 when the company's ammonium nitrate was used by home-grown terrorist Timothy McVeigh to bomb the Alfred P Murrah building in Oklahoma City, killing 168 people and injuring hundreds of others. The horror was felt keenly in London in part because, in the view of some, the subsequent legal actions could bankrupt the entire company. Measures to counter this included separating the US and Canadian assets so the latter could escape sanction. In the end the company escaped major issues, but the enforced separation of the US and Canadian businesses added to the disjointed nature of the North American explosives assets.

In London, Clinch joined Peter Kirby among the Australian executives working at senior levels in head office. In 1997 the decision was taken to instruct Rob Margetts, an ICI Plc representative on the Australian board, to tell the rest of the board that London was selling its stake in Australia.

Clinch, from this point on, was kept out of the discussions for obvious conflict reasons, but Kirby was central to London's attempts to buy Dulux Australia for London, even floating a potential swap with ICI Plc's international explosives operation. The perception in Australia had long ago rightly pointed to the parent being less interested in explosives.

Kirby, the former Australian Dulux boss, was the person leading the negotiations from the ICI Plc side. CEO Warren Haynes led it from Australia and refused to deal.

The concept of an asset swap for Dulux was never formally put to the Australian board and indeed, given the magnitude of the sell-down's coming $2.3 billion equity sale, it was felt commercially it was better to leave Australia as it was. The untimely death of Warren Haynes in the middle of the sale process, in June 1997, initially upset London's hope for continuity to smooth the sale. His replacement, Philip Weickhardt, managed the transition well.

The now London-based Clinch told Australian chair Ben Lochtenberg he was not interested in the top job in Australia. This left the way clear for Philip Weickhardt to take the job. He was chosen as the new chief executive for what was about to be called Orica.

As an aside, Haynes, Clinch and one-time Dulux boss Doug Curlewis all attended Sydney's Shore School in different years but at the same time in the 1950s and '60s. ICI Australia was not quite the Melbourne stronghold some had suspected.

Once the ICI Plc sell-out went through, in 1997 the Australian board hired McKinsey and financial advisers Centaurus to prepare a strategy document on just how the new Australian company should look. They recommended and the board endorsed the plans, including selling the technical paints business, pharmaceuticals and crop protection and, importantly, buying the ICI Plc international explosives business.

Weickhardt wasted no time in making the company's desires known to Margetts, his former Australian board colleague. One year later, after constant pressure from Melbourne, London put its international explosives arm on the block. Orica, as ICI Australia renamed itself in February 1998, was at the front of the queue.

Others to lob bids included the South African–based AECI (another ICI Plc offshoot) and private equity bidders, including Bain. Australia paid $570 million for the ICI Plc explosives assets. Clinch had earlier made clear to his former colleagues in Australia that from his new London vantage point, Australia was the best explosives business in the global portfolio by some considerable distance.

The deal included the explosives operations in Canada, Latin America and Europe and distribution business in the United States. The division made a trading profit of US$3 million the year before it was sold on sales of US$46 million. ICI Plc booked an £85 million profit on the deal.

Orica was now the global leader in the explosives industry, with a market share at the time of 20 per cent. For a company that for much of its existence had been a minnow in the corporate world, hiding behind import tariff walls, Orica now had a base from which it could lead. The business manufactured and supplied a range of bulk and packaged explosive and blast management services to the mining, quarrying, construction and allied exploration industries worldwide, employing 27,000 people.

The deal was in many respects a once-in-a-lifetime opportunity for Orica, but there were plenty of issues to be solved before the returns from the new operations in the US, Canada, Brazil, Mexico, Chile and the UK could come close to matching those in Australia. Six nitroglycerine plants were closed and replaced with ammonium nitrate technology and 5500 people were let go. Clinch led the process from a new base in Denver, Colorado, before he retired in 2000 and was replaced by Graeme Liebelt.

Liebelt continued in Denver for four years, masterminding the switch from an explosives to a mining services company using explosives as the base from which to offer a broader range of services. The problems in the US were attributed to a fragmented business with too many sites and operators. It also ran afoul of the commodities cycle in a region in which the company was a net purchaser of ammonium nitrate. It was caught with long-term explosives contracts based on a lower price before ammonia prices took off. Not surprisingly, customers were happy to let Orica wear the pain.

Orica had inherited ICI's reputation of playing hardball in price talks. An apocryphal tale has it that Philip Weickhardt, on assuming the top job at ICI Australia, travelled to London where he met Rio Tinto boss Leigh Clifford and asked how the company was regarded. Clifford responded, 'Your people and assets are top class, but we hate you because you are a monopoly and charge whatever you can'.

Rio was also a notoriously slow payer as a customer, prompting the people in the Orica explosives division to respond by threatening penalties unless bills were settled in a timely fashion. Relations between the big miners and the company were often tense, and it is only in more recent times that this has changed, in part as Orica has attempted to manage the process more as a partnership.

During his time running Orica from 2005 to 2011, Liebelt completed landmark transactions such as the $900 million purchase of Dyno Nobel's international assets and the less successful $857 million Minova deal (discussed in chapter 16). The latter

Top: Operator in an underground mine.
Bottom: Packing detonating cord for transport.


OXIDIZING AGENT
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ICIS


ICI
Uniflex
DETONATING
EXPLOSIVE
IES

If some criticised Orica for the earlier acquisition of the old ICI Plc business, pointing to the hefty price paid and massive clean-up required, the Dyno deal, thanks to some masterful deal-making, was seen as a winner from the beginning.

was a former BP chemicals unit providing specialist chemical products for underground mining and civil engineering activities. After several write-downs, Minova was sold to Aurelius in December 2021 for $180 million.

The US$1.7 billion Dyno transaction in 2006 was a joint venture between Orica and Macquarie Bank. The latter purchased the Australian and North American assets, which anti-trust concerns prevented Orica buying. The deal cemented Orica's position as the global leader in explosives and took the company as far as it could go in explosives acquisitions.

The deal was orchestrated by Andrew Larke and Macquarie Bank executive Robin Bishop in what was an investment banking tour de force. Larke, a former corporate law partner, had come to the company after working with Malcolm Broomhead at North Limited. He served a pivotal role in the myriad deals conducted by the company after joining under Broomhead's reign and now serves as chair of the chlor-alkali spin-off Ixom, which is based at One Nicholson Street.

Among other roles he carried out during the Dyno deal, Larke made multiple visits to Brussels to convince feared EC Competition Commissioner Neelie Kroes the deal didn't breach regulations. Dyno was long coveted by Orica, but the seller, European private equity fund Industri Kapital, was rightly nervous about the anti-trust ramifications.

Orica paid $900 million for the international assets and Macquarie floated the Australian and North American assets, which were later acquired by former Orica division Incitec Pivot. In 2022 Incitec moved to sell its fertiliser assets to split the company into explosives and fertilisers, just as Orica had done more than a decade earlier.

If some criticised Orica for the earlier acquisition of the old ICI Plc business, pointing to the hefty price paid and massive clean-up required, the Dyno deal, thanks to some masterful deal-making, was seen as a winner from the beginning.

By 2008, having spent time in different divisions across the company, John Beevers had climbed the ranks to be mining services chief executive, based in Singapore. His time leading the technology division underlined the need for working with adjoining specialists because, as he says, no-one has all the answers. The flow of products developed later included WebGen™, a wireless detonator, with the aim of reducing or eliminating safety risks in part by minimising the need for human intervention and incorporating

A day in the life of Fabian Villarreal Hernández

As the sun rises over the serene landscape of Cuatrocienegas, a small town in Mexico, Fabian Villarreal Hernández begins his day, much like he has been doing for the past 24 years at Orica's Cuatrocienegas (4C) plant. The journey to the 4C plant is a familiar one for Fabian. He leaves his house at 8 a.m. and takes the bus, a routine he has followed for many years. The short 15-minute transfer brings him to the plant, where he is welcomed by the familiar faces of his colleagues and friends.

Once inside the plant, Fabian heads straight to the quality control offices, where his day officially begins. The first task on his list is to check emails and review the shipments of products leaving the plant. Accuracy and traceability are crucial in the explosives industry, and Fabian takes his responsibilities seriously.

Next, he makes his way to the shipping supervision offices to collect the shipping orders for the day. Armed with this information, he heads to the production offices to gather essential traceability data on the shipped products. This meticulous process ensures that Orica maintains its reputation for delivering high-quality products to its clients.

Back in the quality office, Fabian begins the task of capturing all the information he has gathered. This data will be sent to customers, ensuring they have a complete and accurate record of the products they have received.

Aside from his primary responsibilities, Fabian also lends a helping hand in various other tasks. He supports the transfer of boxes of retention samples to powder magazine number 1, ensuring the plant has proper storage of historical product samples. Additionally, he takes part in the transfer of Powersplit product boxes from powder magazine 1 to the packaging plant for reprocessing or destruction. Destruction of obsolete product and retention samples also falls under his responsibilities.

Another critical aspect of Fabian's role is performing calibration checks for all internal and external equipment within the 4C plant. This ensures that the equipment used in the manufacturing and quality control processes is operating accurately and reliably.

Fabian's journey to his current position has been one of dedication and embracing opportunity. Orica is his first and only job, and he has made the most of every chance that came his way. After finishing high school, he was presented with the opportunity to work at Orica as a temporary employee. Through hard work, he became a full-time employee in March 2000. His journey through different areas within the 4C plant ultimately led him to his current role in traceability and quality control.

What Fabian enjoys most about his job is the positive work environment and the constant opportunity to learn. Over the years, he has acquired a wealth of knowledge about the products manufactured at the plant. Every day brings new challenges and new information, making his work exciting and fulfilling.

Not only does Fabian find joy in learning, but he also finds great satisfaction in mentoring and educating new staff members. His experience and dedication have made him an invaluable resource to the team, and he takes pride in passing on his knowledge to the next generation of Orica employees.

To those interested in a position like his, Fabian's advice is simple: embrace opportunities when they arise. He encourages others to seize the chances presented to them as they may lead to fulfilling careers and exciting new experiences.

electronic detonators. WebGen™ can reduce extraction costs by eliminating the need to redrill holes.

The explosives division later learned to use more precision across the value chain, and helped to achieve better recovery rates and a reduction in energy usage. The technology was aimed to help customers have a better understanding of their orebodies, both before and after the blasts. The orebody intelligence was helped with products like RHINO™ and DRILLMax™, providing real-time analysis. Bulk explosives technology was boosted with products like FRAGTrack™, which helps with more precise fragmentation analysis.

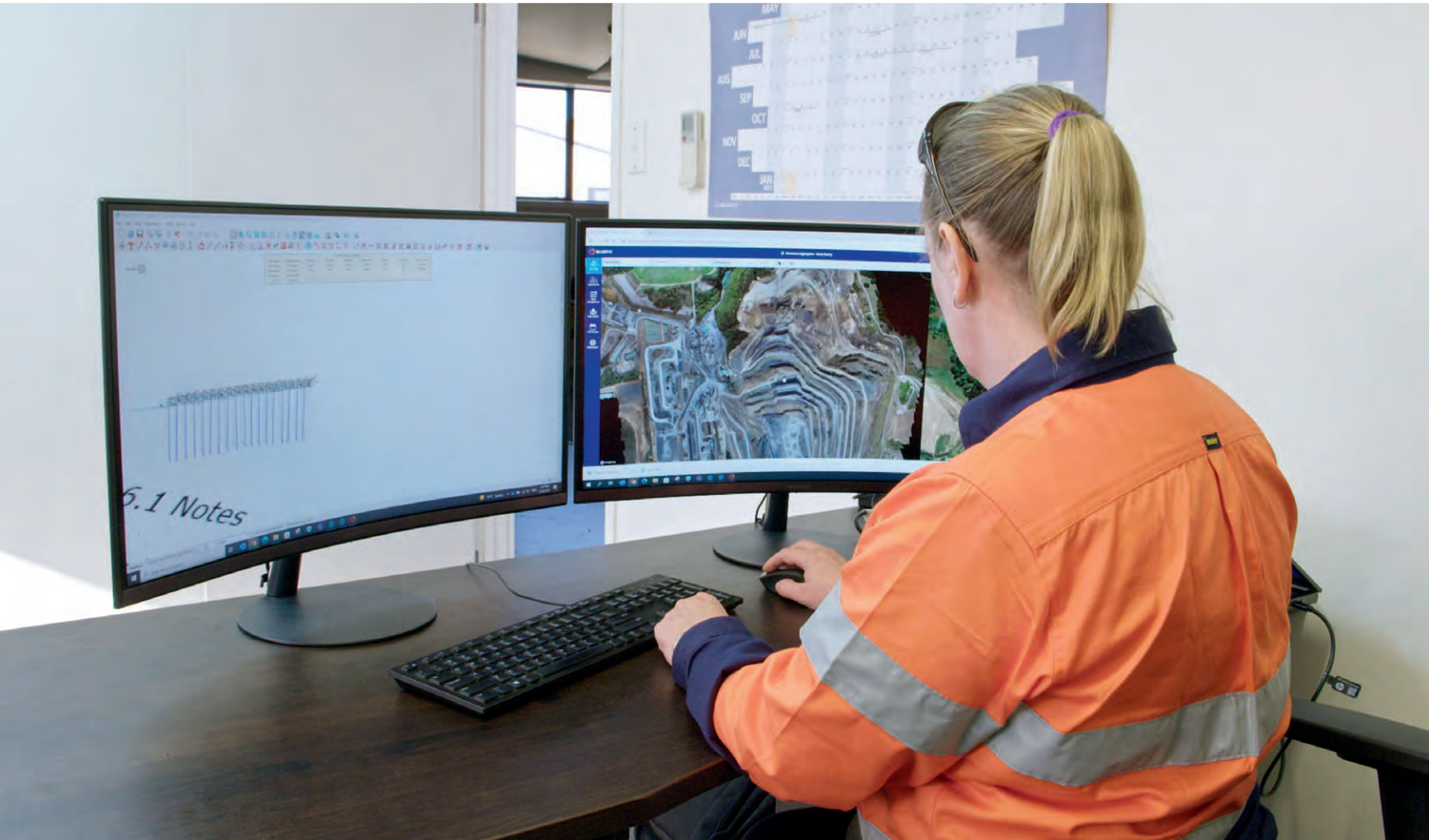
Other new technology projects included i-kon™, which increased shovel productivity by 18 per cent. Orica says these detonators are the most advanced electronic detonators on the market and are particularly suitable for high-value and complex blasts at large open-cut and underground operations and in the most challenging environments. Electronic detonation is more accurate than non-electronic and facilitates blasts that minimise environmental impacts. Using the latest advances from machine-vision AI technology helps this process.

Beevers has been on both sides of the fence. He left Orica in 2012 and joined University of Queensland start-up GroundProbe™ to commercialise its groundbreaking technology using radar and lasers to monitor the stability of mine walls. GroundProbe™ started in 1993 as an industry-funded PhD project at the University of Queensland led by David Noon, Ben Moll and Clifford Walsh. The start-up's technology broke new ground, but it fell into the trap of assuming the technological breakthrough alone would have customers lining up at the door. Beevers' real-world experience taught GroundProbe™ about the importance of customers, a lesson also learned by ICI and Orica employers.

In 2017 GroundProbe™'s private equity owners, Crescent Capital, sold the company to Orica for $205 million. Orica chair Malcom Broomhead demanded some performance guarantees from Beevers, which must have been satisfied as Beevers ended up on the Orica board in 2020.

Beyond blasting, the expansion plans the company had long planned for back in Beevers' days as a mining services executive with Julian Segal and Graeme Liebelt were now starting to take shape.

Top: Orica's WebGen™ wireless technology. Bottom: Orica Digital Solutions BlastIQ™ blast design and optimisation software.


MAY
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6.1 Notes

Brownsburg, Quebec

The Brownsburg site manufactures initiating systems (detonators) for sale worldwide. In particular, Brownsburg sees itself as the Electronic Blasting Systems (EBS) and WebGen™ centre of excellence.

The plant employs 420 people and supplies customers around the world—timing modules to Peru and Brazil, EBS detonators worldwide, silicon to China, India and Brazil, WebGen™ products globally, shock tube to Mexico and semi-finished product to Colombia and India.

The Brownsburg plant was founded in 1875 by Daniel Smith's Hamilton Powder Company to produce black powder, which was used for hunting, quarrying and land clearing. Two years later the company was awarded the lucrative contract to supply the builders of the transnational railway. Hamilton Powder was soon joined at Brownsburg by the Dominion Cartridge Company, which was set up by Captain AL 'Gat' Howard, the local agent for the Gatling gun. In 1883 Nobel Explosives bought the Hamilton plant.

In 1910 the Hamilton Powder Company, Dominion Cartridge Company and several other explosives manufacturers merged to form the Canadian Explosives Company (CXL). In 1929, after merging with the Canadian Salt Co. Ltd, Grasselli Chemical Co. Ltd and Mond Nickel Co., CXL changed its name to Canadian Industries Ltd (CIL). The name change reflected the gradual diversification of the company, which had started making varnish, coated fabrics and other polymers.

CIL was a big player in the North American market, and in 1942 had built the world's second nylon facility in Kingston, Ontario. ICI and US chemical giant DuPont came together as shareholders in CIL, which ended up being owned 55 per cent by Nobel (ICI) and 45 per cent by DuPont.

Long-standing ICI chair Sir Harry McGowan was quoted in *Time* magazine in 1951 as saying, 'unrestricted competition brings eventual chaos'—which explains much about his approach to business. Joint ventures and monopolies in markets were preferred over competitive ones, but four years after McGowan stepped down in 1950 aged 77, the US courts put an end to one of ICI's most productive partnerships with DuPont.

From 1954 the two were ordered to unwind their global relationships, which included Australia and Canada. The case against the companies alleged they attempted to restrain trade by splitting markets ranging from rayon to synthetic rubber to insecticides. As a result, ICI was now in sole control of CIL.

In 1976 CIL abandoned its munitions business to concentrate on chemical and synthetic products. In 1981 the company moved its head office from Montreal to Toronto and the research lab first established in 1916 was moved from McMasterville in Quebec to Mississauga in Ontario.

Orica assumed control of the explosives side of the business in 1998, although CIL continued to operate its popular paint business under ICI. In 2008 this was sold to Akzo Nobel as part of its US$16.2 billion takeover of ICI globally.

The first EBS unit was manufactured at Brownsburg in 2006. In May 2019 the plant produced its 100-millionth electronic detonator, marking a milestone for the facility Adam Mooney, Orica's Vice President, Electronic Blasting Systems, said: 'Reaching the 100 million mark demonstrates our commitment to customers in delivering a high-quality and reliable supply of innovative blasting systems.

'Our state-of-the-art Brownsburg facility produces the full range of electronic blasting systems for surface and underground operations, including i-kon™, uni tronic™, eDev™ and the world-first wireless initiation system, WebGen™.'

An operator at Orica's Brownsburg EBS manufacturing centre in Canada.

Since the first-generation EBS, Orica has improved delivery with advanced initiation technologies, which help boost customer productivity with larger blasts, faster deployment, and improved overall fragmentation and vibration control. The detonators were designed with multiple safety features, including protection from lightning strikes. These were tested in 2018 when an i-kon™ III detonator in the Hunter Valley region of Australia was struck by lightning and did not initiate an explosion.

WebGen™ was a critical precursor to automation and was followed by a range of digital products, including automated blasting and solutions like the BlastIQ™ platform. This cloud-based digital platform was designed to allow continuous outcome improvement through data integration.

Leah Barlow, Orica's then Vice President, Initiating Systems and Packaged Explosives Manufacturing, noted in a press release: 'The Brownsburg facility prides itself on being a safety leader in Orica, with an excellent focus on safety systems and a proactive view to managing risk. Our robust quality control procedures coupled with a strong working relationship with our critical suppliers enable us to deliver EBS detonators that ensure safe, precise and reliable fires around the world'. She also mentioned that Brownsburg employees volunteer over 350 hours annually to benefit the Brownsburg community in areas such as education and healthcare.

Carseland, Alberta

When CIL agreed in 1974 with Cominco to jointly develop an ammonium nitrate plant at Carseland, outside Calgary, Alberta, in Canada, the ICI Plc representatives on the CIL board issued two directives: the plant had to operate on a British-style team system and be commissioned in ICI tradition. No-one explained in any detail what either directive meant, so it was left to the local managers to make their own way.

The Carseland plant was built on a greenfields site near the Bow River, for water access, and in Wheatland County, which had favourable property tax arrangements. Four sections of land were purchased for the industrial complex and agricultural buffer zone. CIL owned half a section, with the remainder purchased by Cominco.

The partner companies signed a one-page agreement to outline the conditions for the supply of services to CIL. A fence divided the two operations but a close working relationship was maintained due to the dependence CIL had on the Cominco services and raw materials supply. The feedstock for the CIL plant was ammonia from the Cominco plant. All services and ammonia supply came through a pipeline between the two sites.

CIL at the time had two ICI directors on its board and, while its word was law, just what the rules were was not specified in any detail. Carseland is a long way from London and the instructions from head office came on a one-page letter, so local interpretation was required.

The plant was designed to produce 170,000 tons of ammonium nitrate a year, but has been 'de-bottlenecked' and expanded since to now produce 500,000 tons a year. The Canadian site has for much of its existence been one of the biggest in the world. By comparison, the Kooragang Island site in Australia now produces 430,000 tonnes a year of ammonium nitrate annually.

CIL contracted the German company UHDE (now ThyssenKrupp) to design both nitric acid and ammonium nitrate plants, construction being handled by US-based Foster Wheeler. Nitric acid is a feedstock to the ammonium nitrate plant. The plants were built with the best design technology available for safety, reliability and efficiency. The nitric acid plant was a dual-pressure design.

All process water was recycled on the sites. Rainwater and cooling tower blowdown went to an irrigation pond that Cominco managed for irrigating the agricultural land surrounding the sites. This service was also included in the agreement between the two companies.

Industrial relations at the site proved to be problematic at first. CIL veteran Doug Troop, the first Carseland plant manager, had come from a series of strongly unionised plants in Beloeil, Quebec, and the local Calgary works. CIL was originally based in Montreal before establishing its head office in Toronto, which meant traditionally the sites were run by English-speaking managers and staffed by French speakers. The bosses didn't speak French and the workers who could speak English refused to do so.

Troop also had to contend with an existing pay system by which the workers were paid by the hour and if there was no work they were sent home; they therefore never knew how much they would earn. His team system started with conversion to monthly salaries so everyone knew how much money they would earn. He also introduced a more consensus-style approach in decision-making. Everyone was told what was planned, and everyone had an opportunity to express their views and help make decisions.

Paul Healy, who worked and managed the site from 1975 to 2005, said the team system worked so well that the plant, while one of the biggest in the world, operated during his time with just 47 people compared to 70 people today.

ICI and, later, Orica executives have over the years studied the plant as a model for their Australian operations. The team system was vastly different to that which then operated in Britain and Australia, where decisions tended to be made at head office, not on the shop floor.

Carseland was also the first Orica plant to decarbonise its nitrogen facilities, serving as a model for the later operation at Kooragang Island. Both plants used decarbonising facilities designed by ThyssenKrupp.

Orica's Carseland ammonium nitrate manufacturing centre in Canada.

Healy was the last of the CIL site managers at Carseland. Like the Brownsburg site, Carseland came under Orica's control in 1998. Orica's Stuart Newman took over from Healy in 2005 and it has been run by Australians ever since.

The Carseland site is now shared with Nutrien after Cominco sold out of fertilisers. Under the original joint venture Cominco sold explosives to its customers, with the major one being its nearby Fording Coal operations. CIL was only an explosives producer at the time, but because initial output was bigger than its customer base, it also sold into the fertiliser market.

ICI later withdrew completely from the fertiliser market in North America in the wake of the Oklahoma City bombing in 1995.

ICI in London was terrified it would suffer massive liability claims flowing from the tragedy, which potentially could have bankrupted the company. In the end its worst fears were not realised.

It was, however, a line-in-the-sand moment, that resulted in the company moving out of the fertiliser market, which could be sold to the general public, and instead concentrating on the explosives market, which was sold to the commercial market.


PIONEER

14 | The number one priority, safety

Safety holds an elevated position in company management.

Each chief executive has brought their own style to the issue while holding it paramount. In 2024 at board level, long-time former executive John Beevers was the responsible board member for Orica's Safety and Sustainability Committee. At executive level, Leah Barlow, who also heads discrete manufacturing, is in charge of safety, health, environment and security (SHES).

Barlow follows the LEAN management system pioneered by Toyota. The aim is to deliver value, as defined by the customer, by eliminating waste and improving processes. Safety fits well within this construct. The model gives more responsibility to people at the operational level, empowering them to make decisions and, crucially, to take charge of safety controls. This means the people at the level who have the power to stop a process can do so if the safety protocols are not in place. By giving people exposed to the hazards more control over the standards it ensures they will verify controls for their own safety and in the process help transfer knowledge.

The theory on good safety management says a good leader listens to the people on the ground as they are the experts, is curious about how the process works, and can walk in the workers' shoes. The right dashboards at the workplace help showcase that safety is the priority, as is personal accountability and focus on rewarding when controls are used while challenging the system when operating as normal. Plant managers are rotated so take knowledge to new jobs and help educate people.

For senior managers, 25 per cent of short-term incentives are based on safety performance, so if there is an accident, there goes your short-term bonus. This tends to help prioritise the issue. The company also incorporates safety as a key criterion in mergers and acquisitions activity.

Daniel Moore, Vice President SHES, first joined Orica in 2006 from a stint with US-based chemical concern Huntsman. He rejoined in 2022 after a decade working with AGL and Aurora.

One of Moore's team, senior safety specialist Adam Wiles, an eight-year veteran, has a global role in managing major hazards. He chose the work in part prompted by

Previous spread: Operator in an underground mine.
Right: Orica operators on site in Peru.


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Orica team members on site.

Orica operators on site at Cumberland River Quarry, USA.

Safety equipment and items from the early years at Deer Park, Australia.

the loss of an uncle in a coalmining tragedy, which taught him first hand the impact such events have on families.

Wiles has a master's degree in occupational and environmental health. He is part of the 12-person head office group that travels the Orica world to spread the message, ensure existing systems are in place and audit processes, and learn how to do better. The Orica SHES team also includes regional SHES staff and operational support in the different geographic and product divisions.

Safety is also at the centre of the technology now employed at mine sites. At Orica Latin America, for example, the company has trialled a 'virtual co-pilot' system that controls and monitors the speed of vehicles delivering Orica products and informs drivers about the risks and hazards on their defined routes. The system incorporates a digital Risk Route Assessment, which tells both driver and supervisor how fast the driver is going, how much rest they have had and whether they are following the right route.

According to Rita Carvalho, head of SHES at Orica Latin America, the company is also working with contractors to provide training and awareness sessions on company requirements. Another program, 'Sharp eyes on the road', designed to shape safer driver behaviour, has been rolled out in Brazil for external transport carriers.

Orica products also have a safety focus. WebGen™ and other wireless initiatives remove workers from danger and GroundProbe™ helps monitor the safety of mine walls.

In December 2022 Orica and Epiroc, in partnership with Agnico Eagle Mines Limited, successfully commenced live blasting with Avatel™, the world's first semi-automated wireless underground development charging solution at Agnico Eagle's Kittilä mine in Finland. The milestone brought to life an industry-driven concept that dramatically improves safety at the face.

Avatel enables a single operator to prepare and wirelessly complete a full charging cycle from the safety of an enclosed cabin while offering the best available blast outcomes through the integration of Orica and Epiroc's flagship digital, automation and blasting technologies. Orica chief technology officer Angus Melbourne said in a company press release in December 2022, 'Together with Epiroc and Agnico Eagle we are extremely proud of the team in creating a solution that keeps people out of harm's way during what is considered one of the highest risk activities for underground miners around the globe'.

In the previous six years the company had sadly lost six people, 22 since 2000. Of course, for the victim's family each incident ranks as the worst possible thing that could happen, but the impact on a company that places the highest priority on work-place safety is also significant.

When tragedy happens, the company has procedures in place to help those impacted and stop it from happening again.

Orica employee on site.

Eladio Landa's half a century at Orica

Eladio Landa's employment journey is a remarkable one. He is a boiler operator from the company's Arequipa site in Peru who has been with Orica for 50 years. Eladio's journey began in 1973 at Mechas del Sur and evolved through acquisitions by Enexsa, Dyno Nobel and, finally, Orica. 'It has always been the same company since I started. We passed through acquisitions processes and change of names, but always in the same company,' Eladio says.

From being an electrician, lathe operator and welder to pivotal roles in operation and production lines, Eladio has experienced many different responsibilities in his half century with the company, embracing each one with diligence and commitment. 'I have learned a little bit of everything,' he explained. 'My bosses were good leaders, always bringing new teachings and guiding me during the process.'

Eladio attributes his long tenure with Orica to the respect and camaraderie embedded in the culture of the organisation, expressing his fondness for the company's inclusive and supportive environment. He explained, 'I learned to care and trust the company'. Eladio recalls the many transformations in Orica across his 50 years, especially the advancements in safety, 'the improvement in safety and work conditions has been the biggest change. The current work conditions are nothing compared to what they were before, during my time safety has evolved a lot'. Eladio values the ongoing commitment to improvement and Orica's uncompromising stance on safety, seeing them as the key to the company's longevity. 'In my opinion,' he says, 'Orica is constantly improving, production has been steady, and the most important thing is that safety is paramount for the company'.

A surprise celebration commemorating his 50-year milestone holds a special place in Eladio's memories at Orica. 'I had never seen a colleague recognised like that. At the beginning, I thought it was a joke. My family and friends all knew, except me, and when they gave me the surprise, I had a mix of beautiful feelings and felt so happy.'

Seeing the growth of his colleagues and the evolution of Orica fills Eladio with joy and pride. 'I look at all my colleagues and it makes me happy to know how much they have grown and how the company is evolving.' He seeks to encourage all at Orica, especially the newer generations, saying, 'Let's keep on improving and learning, and keep the new generations coming through Orica'.


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RED ZONE

15 | The Dyno deal and Incitec Pivot

In 2004, managing director Malcolm Broomhead was on a ski chairlift in Beaver Creek outside Denver, Colorado, next to then explosives division boss Graeme Liebelt, when strategy chief Andrew Larke rang from Melbourne. The day's skiing was temporarily interrupted with an update on the proposed Dyno Nobel acquisition. The news was positive: a pathway had appeared for Orica to buy the non-US and Australian assets of Dyno Nobel, which was then owned by Norwegian private equity fund Industri Kapital.

The purchase of the company, established in 1865 by the founder of modern explosives and ICI shareholder Alfred Nobel, marked a remarkable step in the journey for Orica, cementing its position as the world's biggest explosives supplier. But like many things in the company's history, there were twists to the tale, including the later entry of Incitec, a one-time stablemate, as a rival.

Orica, and ICI Australia before it, made ammonium nitrate, which is a key ingredient in both explosives and fertilisers. In Broomhead's time at the helm (2001–05), management and the board thought there were two key negatives with the fertiliser business: the weather, which sets crop schedules, and international currency fluctuations. The combination of the two meant highly cyclical fertiliser prices and hence unreliable income.

The fertiliser division indeed had fluctuating fortunes. A year after ICI Plc sold out of Australia in 1997, the fertiliser division was the company's highest earner at $128.3 million, compared to explosives at $118.4 million, and chemicals and consumer, which both reported earnings of $93 million. But market valuations rated fertilisers at just 5.5 times earnings, or $709.4 million, against explosives at nine times, or $1.3 billion, and consumer at 8.5 times, or $961.4 million—the difference being lack of fertiliser predictability.

Orica management separated the division and its cyclical earnings from the rest of the company. Incitec was first listed on the Australian Stock Exchange in 2003, creating a separate Orica fertiliser division. Incitec had started life with the merger

Previous spread: IPL Phosphate Hill Manufacturing Facility, Queensland, Australia.


DYNO
Dyno Nobel
Groundbreaking Performance
Bennett's Lake Quarry 2022
LET'S GET IT ON!
Personal Protective Equipment
I DYNO EXPLOSIVES
2020
Winchester Operations
Site-Specific Hazard Awareness Trained
2020
Longview Operations
Site-Specific Hazard Awareness Trained
2019
Luttrell Underground Operations
Site-Specific Hazard Awareness Trained
2019
Luttrell Surface Operations
Site-Specific Hazard Awareness Trained
HAZARD TRAINING
Greenback Quarry
2021
BLUE WATER
HAZARD TRAINING
Lebanon Quarry
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BLUE WATER
HAZARD TRAINING
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NEMESIS

Pivot superphosphate.

of ICI's Consolidated Fertilizers Ltd and Australian Fertiliser Ltd in 1985. One of its competitors, Pivot Limited, dated back to 1919 with the formation of the Phosphate Co-operative Company of Australia Limited.

Orica wanted to purchase Pivot and merge it with Incitec. This was duly done in 2003, creating Incitec Pivot Ltd. Three years later the company's fertiliser production capacity more than doubled with the purchase of Southern Cross Fertilisers. Under the Orica proposal to buy Pivot, its shareholders emerged with a 30 per cent stake in the combined company while Orica owned 70 per cent. The new entity was listed on the ASX and created the largest fertiliser business in Australia, with annual revenue streams of more than $1 billion.

This all looks straightforward on paper today but at the time it was an extraordinary battle with several rivals attempting to intervene, including Michael Chaney at Wesfarmers, who wanted to merge his CSBP fertiliser division with Pivot to provide fertiliser operations on both sides of the country. As events transpired the numbers didn't work out for Chaney and no bid was made.

Wesfarmers incursions and rumoured takeovers over the years around ICI Australia and Orica were frequent, creating plenty of headlines but little in the way of actual deals. Ironically, Chaney, who ran Wesfarmers from 1992 to 2005, won plaudits at the time with his inaction, credited as financial discipline.

The Incitec Pivot merger hit the political inner circle because Incitec was previously based in Brisbane and under the Orica plans head office would move to Melbourne, which was where Pivot was also headquartered.

The agricultural sector was a hotbed of corporate deals in 2002. Incitec sold Doug Rathbone's Nufarm, its loss-making Crop Care business for $75 million, which in turn

When Orica launched its bid for the Incitec minorities in 2002, Futuris snapped up a 22 per cent stake in the company, which was enough for a blocking stake on future deals.

sold Orica its Fernz specialty chemical business for $60 million. This was five years after the ICI Plc sell-down as Orica was working to maximise returns from its portfolio.

Orica attempted to mop up the minorities in Incitec only to be at least temporarily thwarted by Futuris, a conglomerate vehicle that included the Elders rural merchandise network and run at the time by former investment banker Les Wozniczka. The company changed its name to Elders in 2009.

When Orica launched its bid for the Incitec minorities in 2002, Futuris snapped up a 22 per cent stake in the company, which was enough for a blocking stake on future deals. From November that year Futuris ramped up its campaign against Orica, asserting redress on what it claims were unfair ammonium nitrate pricing arrangements between Orica and Incitec. It demanded Orica demonstrate the benefits of the recent Crop Care and Fernz Specialty Chemicals sales to Nufarm. Orica maintained its commitment throughout not to overpay for the minorities and treated Futuris's ploys as classic greenmail tactics. Either way, it added to the complexity of the deal.

Orica wanted to break up Incitec and keep hold of its ammonia nitrate business, while Pivot only wanted Incitec's fertiliser division so the new group would remain a pure fertiliser company. Into the mix was added Incitec's agricultural chemical business, which neither party seemed to want. Futuris told investors it had not invested over $170 million in Incitec to be a portfolio investor.

In October 2002 Orica found the breakthrough to the impasse by dropping its requirement for 100 per cent ownership of the Incitec industrial chemicals business. Futuris argued Orica was undervaluing the Incitec chemical assets at $315 million when they were worth more like $400 million.

Eventually Orica agreed to buy out Futuris and the consolidation proceeded, albeit four years later than planned. In July 2003 Incitec Pivot listed on the ASX after completing the corporate manoeuvring that had resulted in the merging of Orica's Incitec Fertilisers unit and Pivot. The merger created a dominant force in the fertiliser industry, with national market share of more than 50 per cent and east coast market share said to be more than 70 per cent.

Incitec Pivot's first chair was John Watson, formerly chairman of Pivot, and Incitec Fertilisers managing director Greg Witcombe took the top management job. Witcombe had arguably performed a minor miracle in convincing the rural industry of the need to consolidate the fertiliser industry. Witcombe figured the fertiliser industry had long been inefficient and suppliers unprofitable, so everyone missed out and there was a

duplication of high-priced assets. Consolidation would benefit both suppliers and their farmer customers.

At the time, Incitec Pivot had a market value of more than $930 million, bigger than Nufarm, GrainCorp and ABB Grain, and was second only to AWB Ltd in terms of listed agribusiness companies. The consolidation completed, Witcombe had a network of distribution centres that could ship 3 million tonnes of fertilisers a year to farmers around the country. And Orica had finally offloaded its unwanted child in the process.

The dealing continued and two years later, in 2005, AWB's new agribusiness subsidiary, Landmark, and Futuris's rural services arm, Elders, formed a joint venture in December called ELF Australia that paid about $60 million for 66.6 per cent of Hi-Fert from the then BHP controlled WMC Resources. Hi-Fert would continue to distribute its diammonium phosphate and mono-ammonium phosphate fertilisers through Southern Cross Fertilisers, then a subsidiary of BHP Billiton. Elders remained a big customer of Incitec Pivot.

Finally, in May 2006, Orica's desire to focus on explosives resulted in the divestment of the company's majority stake in Incitec Pivot. The sale raised $750 million.

Back to September 2005: the Dyno Nobel deal was clinched after Orica and Macquarie Bank created a structure to clear anti-trust issues. Orica's Andrew Larke and Macquarie's Robin Bishop were the masterminds of the deal, in which Orica and Macquarie acquired all of Dyno from the Norwegian private equity group Industri Kapital for $2.2 billion. Dyno was split, Orica picking up the European, Middle East, Latin American and Asian assets for $900 million while Macquarie acquired, then listed, Dyno's Australian and North American arms, in which it had retained a 54 per cent stake.

Dyno listed in Australia in April 2006 with a value of $1.9 billion. Macquarie pocketed a profit of $600 million on the share sale.

Incitec Pivot, then under the control of Julian Segal, acquired a 13 per cent stake in the company soon after listing, a signal of his intentions. Segal had replaced Greg Witcombe in 2005, with the latter slated to join Malcolm Broomhead's office of chief executive, based in head office. The post never eventuated because Broomhead became sick and stepped down to be replaced by a new chief executive, Graeme Liebelt. Liebelt was not a fan of the chief executive office concept and instead promoted Witcombe to head office looking after group HR, corporate affairs and community for a few years before later running the chemicals division. This was a big portfolio that included manufacturing, trading, mining chemicals and water care.

Witcombe, a science major, had joined the company in 1976 in the research department in Ascot Vale under Asbjorn Baklien before moving to the commercial side as a product manager in the rural division. Witcombe was familiar with the chemicals business as his father had worked for US giant Monsanto.

Segal, a chemical engineer by training, graduated from the Israel Institute of Technology and joined Orica in 1995 and worked in senior positions, including in Denver for the mining services division. He had joined after a stint in Australia with building supply firm James Hardie and before that with South African chemical giant Sasol. Segal left the company in 2009 to join Caltex Australia as its chief executive.

In 2008 Incitec Pivot made the long-planned recommended cash and shares offer for Dyno Nobel that valued the Australian-listed explosives group at A$3.3billion and,

Graeme Liebelt was appointed chief executive officer in 2005.

in the process, Segal, the long-time Orica executive, had acquired that company's major competitor in Australia. The sale meant that the $2.2 billion Dyno purchase in 2005 resulted in the sale of most of that company's assets to Orica for $900 million that year, then three years later to its offshoot Incitec Pivot for $3.3 billion. Throw in the $600 million Macquarie earned on the float and from any view it was a grand deal.

This situation, with Incitec Pivot now a competitor, was even more remarkable given the historic lengths ICI and ICI Australia, over their history, would go to to protect their market share and monopoly status. The competitor was now led by Segal and others who had been trained in the game by Orica.

On acquisition in 2008, the pitch was that the two were a natural fit because they were both nitrogen-based manufacturing businesses with ammonium nitrate used to make both explosives and fertiliser. Analyst commentary, however, was mixed.

The Dyno deal in Australia brought together all the enterprises originated by William Bickford, Alfred Nobel and Augustus Wolskel, Pivot's founder. The fact that Dyno was already a competitor meant anti-trust rules prevented Orica from buying it. Dyno had been a founding shareholder in ICI and in more recent times had been encouraged into Australia by a key customer, BHP, to serve the function of keeping the pressure on Orica.

Segal's attitude was that the move was not an issue, because Orica did not support the concept of ammonium nitrate plants servicing both explosives and fertilisers. He argued in the alternative: having both assets under the one roof would give Incitec Pivot the ability to shift production between the two.

When Malcolm Broomhead originally appointed Segal to head Incitec Pivot, he made it clear he was not interested in learning about the weather's effects on fertiliser sales, only in things he could control. The old ICI superiority remained and when asked some years later by a reporter about the competition, the Orica chief at the time, Alberto Calderon, confidently replied that his technology was light years ahead.

Ironically enough, 14 years later, in 2022, Incitec Pivot turned back the clock and proposed splitting the company into a fertiliser and explosives division for much the same reason that prompted the original Incitec sale.


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TRIMEX 3000
IMPORTANT
DO NOT OPEN
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19 mm x 900 mm

16 | The Minova problem

Graeme Liebelt and his team were chuffed in October 2006 when, at $857 million, as the fourth bidder in the auction for mining chemicals concern Minova, Orica was chosen as the winning bidder by the seller, UK private equity firm Close Brothers. Strategically, the company was a perfect fit, in line with Orica's strategy of building its mining services assets.

But 16 years later, when the division (which included the $775 million Excel acquisition) was sold to German private equity firm Aurelius Group for $180 million, or just 20 per cent of the combined purchase price, shareholders were less than impressed. Relieved for certain, but not impressed with the outcome.

On some estimates the deal cost shareholders nearly $2 billion over the period, including a $1.7 billion write-down in August 2015. It seemed Orica just could not get the assets to work, tried to sell it and failed, until finally Aurelius came to the party for $180 million.

Minova was a specialist chemical concern aimed mainly at underground mining activities. It earned 69 per cent of its 2005 sales from the underground coalmining sector, 16 per cent from metals mining and 15 per cent from underground civil engineering. The company had a storied history. Founded in 1882, it was a former division of Burmah Oil, which in turn was acquired by BP. It operated in all of the world's major mining regions except South America, and had more than 1200 employees and 17 manufacturing facilities in ten countries.

Graeme Liebelt was Orica's chief executive at the time of the purchase, and a prime mover behind the decision to buy. Liebelt was part of a new wave at the company when he joined in 1989 as a senior executive at Dulux, just as managing director Doug Curlewis headed to the UK and Peter Kirby took the Dulux reins. An economics graduate of Adelaide University, Liebelt started his career as an academic, lecturing in economics at what was then the South Australian Institute of Technology before a stint at Philip Morris, led at the time by Curlewis. He joined Dulux as marketing director from his position at Repco, which was part of entrepreneur Bruce Judge's Ariadne empire.

Previous spread: Operators in an underground mine.

Packing of explosives.

Liebelt did stints at head office and Denver in charge of mining services before, at the age of 51, becoming chief executive in 2005. He was one of the lead internal candidates when the decision was taken to find a replacement for Phil Weickhardt in 2001, but the new chair, Don Mercer, chose Malcolm Broomhead instead. Mercer knew Broomhead well from his days at North Ltd, which Mercer also chaired and was acquired by Rio Tinto for $2.8 billion in 2000.

In 2005 Orica had cemented its global leadership in the explosives industry with the landmark US$1.7 billion Dyno Nobel deal, a joint venture with its adviser, Macquarie Bank. Anti-trust issues prevented Orica from buying the Dyno US and Australian assets, but it paid US$685 million for the rest of the company. The deal is covered in the previous chapter, but suffice it to say the in-house deal-maker, Andrew Larke, had a busy few years buying and selling assets for the company.

While Dyno was, on any read, a superb acquisition, not every deal ended happily. Minova was a case in point.

Liebelt saw Minova's operations as complementing Orica's mining services business, with opportunities to grow the business over time. He was quoted in the *Sydney Morning Herald* when the takeover announcement was made: 'Minova is an outstanding business in an attractive and growing market segment that is closely adjacent to

Operators in an underground mine.

Orica's existing mining services business'. The $857 million transaction was a boon for Close Brothers, who had injected just £14.3 million in backing a Minova management buyout three years earlier. Its return from the £240 million buyout was a massive 17 per cent, or three times more than what the prevailing wisdom said was a good deal. Orica had beaten out some of the top houses at the time, including Barclays and Charter House.

Liebelt stressed the deal would not impact the ongoing integration of the Dyno Nobel explosives businesses, but with the benefit of hindsight, some wonder whether the company was so focused on the Dyno deal that everything else came second.

Another acquisition followed a year later, amid the once-in-a-generation mining boom. Orica bought Excel Mining Systems, which made specialty bolts and accessories for use in underground mines, from US private equity firm Snow Phipps Group for US$670 million (A$775 million). Liebelt pointed out that Excel complemented Minova's business, which produced resins used in conjunction with the bolts, and that its business was carried out wholly in the US. He was quoted in the *Sydney Morning Herald*: 'Part of the planning and part of the benefit that we see from this acquisition is that we can take Minova's already well-established position in some other countries and extend Excel's product range into those countries'. He noted that the plans, for both, were over a three-year timeframe.

In 2005 Orica had cemented its global leadership in the explosives industry with the landmark US$1.7 billion Dyno Nobel deal, a joint venture with its adviser, Macquarie Bank.

On paper, integrating both companies made sense, given they were trying to make underground mines safer and in the process support Orica's explosives business. Everyone involved has a different version of what went wrong, ranging from lack of focus to poor execution, but the end result was a financial disaster for Orica shareholders.

Some say Minova on its own was fine and the mistake was to add the 'nuts and bolts' (Excel) to it. Orica was, after all, a chemicals company.

Orica went from predator to prey in April 2007, when a private equity consortium led by Morgan Stanley, and including US heavyweights Bain and Blackstone, knocked on chair Don Mercer's door with a $9.9 billion bid. The offered price of $32 a share was a 30 per cent premium to the market price and in the view of some worth a look.

The company's stock price rocketed to the proposed bid price on news of the approach, in anticipation of a higher bid. The market figured the buyout royalty involved in the deal was not going to let the chance pass, without any other attempt.

Mercer, the former Shell executive and former chief executive of the ANZ Bank, held his nerve and as the Excel deal in September 2007 showed, it was instead business as usual at Orica. In May the previous year, 2006, the company had demerged from Incitec Pivot, selling its stake and raising $750 million. This meant that despite its flurry of acquisitions, at the time the private equity bidders knocked on the door, its balance sheet was conservative, which no doubt was part of the attraction. Some shareholders, including John Sevior at Perpetual, were incensed when Mercer simply said no, without attempting to engage to get a higher price.

When Orica sold Minova in 2021, CEO Sanjeev Gandhi put on a brave face, telling the market: 'The sale of Minova is consistent with our refreshed strategy, which identified Minova as non-core to Orica. This allows us to focus on our four key business verticals of growth—mining; quarry and construction; digital; and mining chemicals'. Its new owners, Aurelius, issued a statement saying Minova's markets had been changing over the past years. The drive for electrification had raised demand for precious metals through hard-rock mining, while thermal coal in 'soft rock' was in structural decline. With its resin know-how, Minova was ideally placed to benefit from the related requirement for deeper and more complex hard-rock mines. Aurelius said it planned to actively support Minova's ongoing transition from soft rock to hard rock in the coming years.

To Orica, that was just fine.

17 | Remediation: Kooragang and beyond

At 8 pm on 17 June 2011, potentially carcinogenic hexavalent chromium gas leaked from Orica's ammonia plant on Kooragang Island, Newcastle. The fallout from this and subsequent leaks cost Orica dearly. In fact, at one point incoming chief executive Ian Smith feared the company was in danger of losing its operating licence.

For decades until its closure in 1999, Newcastle had been synonymous with the BHP steelworks. The steelworks were an integral part of Newcastle from their opening in 1915, employing 11,000 people at their peak, and 2000 people when they shut their doors. Newcastle *was* the steelworks—end of story. In 1969 the ICI Australia–led Eastern Nitrogen consortium started making ammonium nitrate on Kooragang Island, but it remained very much in the shadow of the steelworks.

If you wanted to talk pollution or just about anything in the town, then it was all about the steelworks; everything else paled into insignificance. This may explain why when the chromium gas leak happened, Orica and indeed some of the stakeholders, including the New South Wales Environment Protection Authority (EPA), were caught underprepared.

The initial leak happened on a Tuesday night. In the form of a thin smoke haze, the leak spread across the neighbouring suburb of Stockton. Residents awoke to discover their suburb had been sprayed with yellow soot, and notified the EPA. The leak did not hit the national media until New South Wales Environment Minister Robyn Parker was asked about it on Thursday afternoon, nearly two days after the event.

Kooragang site manager Stuart Newman was in a taxi with some colleagues on the way back to the plant after having briefed the EPA when he heard it on the radio for the first time. He would be sick of hearing about it over the next few months. The company was structured in a way that meant Newman's functional boss was based in Singapore but he was also responsible to Australian manager James Bonner.

A combination of events then elevated the issue to a national one. A later ammonia leak from an adjoining plant a few weeks later compounded the issue. Then there was the fact that arsenic had been used at the site for years and when the big clean-ups

Previous spread: Kooragang Island, New South Wales, Australia.

Truck on site at Kooragang Island.

happened to clear the chromium, the arsenic-contaminated soil started leaking into the Hunter River.

Parents wanted to know whether their children could play outside, joggers rang local radio stations to complain about a tingling sensation on their tongues, and one household had even complained that they had found a dead cockroach in their cupboard. All due to the Kooragang leak.

The chemical leak was daily front-page news in the *Newcastle Herald*, putting pressure on the government. Smith told the author of this book that the New South Wales premier, Barry O'Farrell, said to him when he paid O'Farrell a visit seeking leniency, was 'the first thing you have to do is get me off the front page of the paper'.

No-one was hurt, but the clean-up cost Orica $100 million in direct costs alone. With the benefit of hindsight, the company had let itself down by not being properly engaged with key stakeholders. These included the EPA, politicians, media and local representatives. A community consultative committee was in place, but it was always a struggle to fill it and when the members met it was more often than not to talk about fishing. Getting anyone's attention in the shadow of BHP Steel was a battle.

A New South Wales Parliamentary Report on the 2011 Kooragang Island leaks stated, 'The failure of Orica to inspect the area of Stockton, immediately downwind of the site, until approximately midday on 9 August 2011 was an inadequate response by

the company to the incident … There was an unacceptable delay in Orica's reporting of the incident to the Office of Environment and Heritage on 9 August 2011'.

Referring to an independent review of the incident (the O'Reilly Report), the Parliamentary Report went on: 'A central finding of the report was that Orica failed to notify any regulatory authority of the leak until approximately 16½ hours after the incident had occurred, and initially advised it believed the incident was contained on site. The report further found that this delay in notification by Orica had a direct impact on whether the incident was treated as an emergency, which in turn influenced communication arrangements between response agencies and public communication arrangements.'

Orica Chief Executive Graeme Liebelt told the ABC's Liz Farquhar in December 2011 after more issues that 'the leaks were unacceptable. We are obviously bitterly disappointed about the release of ammonia from Kooragang Island … We have been working very hard since the incident on 8 August to rebuild the trust of the community and to address technical issues on the site'.

Internally, this was the cause of some consternation because while the company had responded to the public outcry by spending around $200 million on remediation, the manufacturing division had long sought funds to fix or prevent precisely the same problems.

A plant shutdown due to an ammonium leak was the second major spill in three months, following a partial shutdown from a 990-kilogram hexavalent chromium spill in August 2011. The ammonium leak resulted in hospitalisations of people in affected areas. The community concern was understandable.

The New South Wales premier, Barry O'Farrell, and Environment Minister Robyn Parker were under pressure amid widespread media coverage of the leaks from Botany. The Kooragang Island leaks in 2011 made the company a convenient political football.

Orica was under extraordinary political pressure due to increased community concerns about industrial contaminants and environmental issues generally. But in Ian Smith in his role as a change agent, Orica had the perfect driver to fast-forward change. Smith was a straight-talking no-nonsense newcomer to Orica. As such, he lacked the baggage that predecessor Graeme Liebelt and his colleagues had had, which made his task easier.

Orica had been aware of environmental dangers long before this. In 1989 CEO Michael Deeley noted that environmental concerns are 'absolutely critical to our ongoing success'. Deeley was confronted by a new wave of environmental activism that raised the issues for the company considerably. How would the company approach the problem?

Opinion polls noted increased concern in the community. A Saulwick poll found 90 per cent of Australians regarded the environment as a serious issue; chemical companies were at the top of the list, with 40 per cent believing chemicals in the atmosphere were the most serious problem. A further 27 per cent were most concerned by pollution of rivers, oceans and bays. Press reports at the time noted that ICI Australia's 1988 annual report had barely mentioned the word 'environment'. The following year the company swung into action.

In a report by Susan Hely in the *Australian Financial Review* in July 1989 headlined 'ICI finds it's not easy being green', Deeley said, 'now the community has taken over

and, to some extent, the matter is being debated by an emotional community and a number of pressure groups'. Environmentalist and politician Ian Cohen of the New South Wales Greens party chained himself to the Botany olefins flare stack to make his views known.

In days past, concerns would have been thrashed out in closed-door meetings with government bureaucrats. Now, negative newspaper reports and action by the Greens and other pressure groups meant a much more public controversy.

Deeley also noted the high cost of clean-ups, which at the time seemed large but ultimately were a fraction of what was ultimately spent. ICI Australia, he noted, had been budgeting for big environmental expenses over the years and had set aside $20 million to pay for the eventual disposal of its intractable waste from the Botany plant, when the method of removal was approved. A further $14 million was available to dispose of toxic wastes from the Rhodes (Sydney) site, formerly owned by CSR. The final Kooragang cost was over $200 million, including a $768,000 fine. This was one of a string of fines incurred by the company in Australia for environmental breaches.

At the 2011 AGM, chair Peter Duncan warned that in the wake of the Kooragang Island leaks, 'our record of sound environmental performance has been damaged'. He added, 'it is a sharp reminder to the board and management to redouble our efforts'.

This meant the company had to explain its actions to the community, which itself was arguably a marked change from past attitudes when the principle was 'We are ICI, why should we explain?'

Safety has always been a major concern for Orica and its predecessor, but this word can take on different meanings when environmental hazards emerge. Day-to-day injury statistics are easier to manage.

In July 1989 the Botany plant manager, Jesse Moore, told the *Australian Financial Review* that ICI Australia had decided to confront the problems openly. 'People around our plant saw us as secretive and not willing to talk, we changed all of that. Now we have an open-door policy.' Just how open was a question of who you talked to.

The Singapore-based mining services boss, John Beevers, organised the Kooragang recovery efforts with a new site manager, Greg Holmes, and made efforts to work more closely with the community. Holmes, like Smith, was a newcomer without any baggage. His predecessor was a self-confessed introvert who didn't enjoy the necessary work in representing the company in the community.

Holmes managed the manufacturing repair work in an attempt to ensure there were no further problems while at the same time handling the external relations issue with Smith. Australian divisional boss James Bonnor also helped with these initiatives.

When things are going well, management is left to the divisions. When there is a problem, head office steps in and in Smith's case this was done across the board.

Chair Peter Duncan noted in the 2012 annual report that earnings were subdued due to problems 'sometimes of the company's own making', including the continued environmental issues and write-downs to its troubled Minova division. A later chair, Russell Caplan, told shareholders in 2014, 'we thought at board and management level that we were pretty good at this stuff [environmental issues]. But we discovered we were not as good as we thought we were'.

Safety has always been a major concern for Orica and its predecessor, but this word can take on different meanings when environmental hazards emerge. Day-to-day injury statistics are easier to manage.

Kooragang Island itself was a highly desired asset in the company, being kept in house by Orica when its fertiliser arm, Incitec, merged with Pivot in 2003 and was then fully divested in 2006.

At the time of the Kooragang spill, the company was well underway with other remediation efforts at its sites, including at Botany. There, the aim was to prevent polluted groundwater running into neighbouring Botany Bay. Deer Park, Yarraville and Gladstone were also in need of major remediation works.

The Botany remediation work started in 2006 and is scheduled to run until 2036, with a provision for the work in the 2022 annual report of $182.8 million. The $100 million Groundwater Treatment Plant aims to prevent the movement of groundwater contaminated with chlorinated hydrocarbons towards Botany Bay and to ensure there are no unacceptable risks to human health and the environment.

Groundwater is pumped from extraction wells, which are aligned in three containment lines, to the plant and up to 6 million litres a day of groundwater is processed to remove and destroy contaminants. In 2012 the plant treated 1800 million litres of contaminated groundwater, of which 1105 million litres was recycled and sold to industrial customers at the Botany Industrial Park, including Qenos and Incitec, reducing their reliance on potable water supply.

At the same time the company was working through options to get rid of hexachlorobenzene (HCB), a by-product of the manufacture of a solvent used for dry cleaning, among other purposes, in a plant closed some years earlier. It took over a decade but Orica ended up shipping the toxic chemical to Finland as part of a clean-up program to get rid of some 60,000 barrels stored at Sydney's Port Botany. The chemical was left over from manufacturing operations running from 1963 to 1991.

Orica originally planned to destroy the waste at Botany Bay in a special incinerator, but the New South Wales Government refused to approve the plant. Subsequent attempts to get other communities to take the waste failed. Orica applied for approval to build a plant using GeoMelt technology to destroy HCB at Botany in around 2000.

The New South Wales Department of Planning appointed an independent review panel in 2004 to review the project with wide community consultation. The panel concluded 'that the project should be undertaken in a more remote New South Wales location [not Botany]'. Orica undertook a feasibility study to find a remote site. This

was unsuccessful and a subsequent report by the review panel in 2006 concluded that export to established facilities for HCB destruction was the only viable option.

The panel noted, 'disposal of hazardous waste is a contentious issue and the conventional high temperature incineration technologies, adopted by advanced nations in Europe and North America, have been avoided in Australia … Lower intensity approaches, used in Australia, have largely proved successful in treating contaminated soils and modest amounts of organic pollutants'. It noted that 'Orica has shunned high temperature incineration and has proposed an alternative thermal process designed for treating high-strength waste … the GeoMelt technology has not yet been used at commercial scale in treating HCB feedstock, nor has the technology been used in treating waste at the volume and concentration proposed in the Orica project'.

The panel concluded, 'the task of treating and disposing of 10,310 tonnes of concentrated HCB waste, together with several thousand tonnes of contaminated storage containers and other materials, and some 60,000 tonnes of contaminated soil, would likely exceed the scale of any hazardous waste project ever undertaken in Australia'.

Under international law, a country must first try to destroy the waste locally and then if this fails find an offshore processor. This was not so easy. In 2007 the German Government backtracked on an agreement to take and incinerate the waste product. Attempts to ship the HCB to Denmark and France also ran into problems, with Greenpeace and others intervening. To ship it out of Australia required specific approval from the government of the exporter, Australia, and the importer, which was Finland. The chemical is packed in new plastic-lined drums, which are in turn coated in plastic and then in specially certified containers that are placed in a dedicated ship 2000 tonnes at a time. When the remediation project started in 2016, there were 15,000 tonnes of HCB waste; in 2023 around 4000 tonnes remained.

Under international rules, once the shipment hits Finland it must be destroyed within 12 months, which is why only 2000 tonnes were shipped at a time. But in 2023 plans were afoot to speed up the process, with the aim of exporting the remaining barrels by 2026.

According to the 2022 Orica annual report, $24 million was put aside to pay for the cost of the shipment and the chemical's destruction. In all, the HCB project has cost Orica well in excess of $100 million.

The Kooragang Island recovery was an exercise in restoring community trust. Site manager Greg Holmes' emphasis was on getting the plant right and reaching out to the community. He posted on LinkedIn, 'Orica and the site were at the receiving end of unprecedented negative press for a prolonged period and lost the support and trust of the local community and the regulators as a result of the incidents.

'I led the site through this crisis and was the face of Orica in Newcastle, setting the site on a sustainable improvement path and in doing so, regained the trust and support of the local community and regulators over time. I began this improvement journey, initially stopping the bleeding by gaining control and at the same time designing the right management structure followed by a comprehensive site organisation structure, and then hiring the most suitable people available to fill key roles. Once I had the right leadership team on board, we began a cultural transformation process, supported by process and asset improvements that left nothing untouched.'

There were significant investments to re-engineer the production processes at Kooragang Island in order to improve operational efficiency and, in particular, to minimise the risk that the breach of containment events would be repeated. Once the physical changes were made, the relationship of trust with the community took longer to repair. The company worked with the Orica Kooragang Island Community Reference Group to develop improved engagement practices. Orica undertook a range of engagement activities with the local community and regulators, including information sessions and site tours, and regular email and SMS updates on plant openings and moves. Air quality monitoring equipment was installed, and community groups were supported by increased sponsorships. The company also backed local surf lifesaving and other local community groups.

The Kooragang Island incident was an important learning experience for Orica and informed how the company would broaden its approach to community engagement. It invested more than $200 million over three years in projects to improve ammonia management and environmental performance.

In 2012, a number of environmental improvement projects at Kooragang Island and Yarwun were either completed or progressed in accordance with timetables agreed upon with the regulators. In the same year Orica received regulatory approvals for an expansion of the Kooragang Island plant to a capacity of 750,000 tonnes per annum. This was a huge turnaround from the negative sentiment at the start of the year.

Remediation works on a long timescale. The Orica remediation team was in 2023 comprised of just a handful of people under Bill Crowe and James Stenning. They serve as on-site advisers at Botany Bay where the plant has around 30 people operating full time and help coordinate efforts globally.

There is also a sustainability team looking at energy-saving improvements around the world. These include steam, energy and lighting use improvements at chemicals' Deer Park site that have reduced greenhouse gas emissions by approximately 175 tonnes per year.

Additional nitrous oxide abatement technology has been added in Australia, with an estimated reduction of over 390,000 tonnes of carbon dioxide equivalent per year to be expected from new abatement from four of Orica's Australian nitric acid plants. This is equivalent to the removal of 150,000 cars from the road.

New abatement was also installed in Nitric Acid Plant 2 at Carseland, Canada, in 2012 and has achieved a reduction of over 63,000 tonnes of carbon dioxide equivalent in less than seven months. This work led the way to the later Kooragang work.

Remediation of over 90,000 tonnes of contaminated soil under a company car park in Botany was completed in 2023. In Victoria, demolition and clean-up of the company's Deer Park and Yarraville sites were well advanced. The demolition, investigation and clean-up at Orica's site in Seneca, USA, and the clean-up of two sites in Norway, Gullaug and Engen advanced with removal of old equipment and the disposal of contaminated soils. Investigations and remediation activity are continuing in the warmer months each year.

In chemicals it's an ongoing process.

The Kooragang Island recovery was an exercise in restoring community trust. Site manager Greg Holmes' emphasis was on getting the plant right and reaching out to the community.

In the wake of the leak, Orica worked hard to foster better relationships with the local Newcastle community. At one stage the owner of the Newcastle Knights rugby league team, Nathan Tinkler, suggested Orica might like to sponsor the team. The offer was declined, but the company did take a journey into sports sponsorship with the GreenEDGE cycling team run by billionaire caravan producer Gerry Ryan.

Smith said the aim was to give the company a profile because no-one really knew what Orica did. Others suggested it was a good way to take the company from the front page to the back page of the newspaper. The three-year deal ended in 2017.

The Kooragang Island site turned 50 in 2019, and the celebrations were attended by present and past employees and community stakeholders. In the previous five years the company contributed an extra $464 million to the local economy, supporting an estimated 5952 jobs in the Hunter region.

In the 2018 financial year the company invested $272,000 in sponsorships and grants, including a new utility for the Botanic Gardens and a library for the Fern Bay Public School, as well as other activities such as regular site visits by local students to learn about ammonia manufacturing.

The site now uses recycled water, which saves the Hunter region using up to 2.9 billion litres of drinking water a year, equivalent to 1100 Olympic swimming pools.

Since starting in 1969, the plants have produced 9.5 million tonnes of ammonia, enough to fertilise 14.5 million hectares of crops. The site has also produced 1.3 million tonnes of pure carbon dioxide, enough to put bubbles in six billion cans of soft drink; 11.5 million tonnes of ammonium nitrate, enough to move more than 14 billion cubic metres of mining overburden; and 9.8 million tonnes of nitric acid. The site is also home to two of Orica's future projects: decarbonisation and hydrogen.

Orica has since partnered with Origin Energy to develop the Hunter Valley Hydrogen Hub, located next to the company's ammonia plant at Kooragang Island. The hub will eventually produce about 5500 tonnes annually of renewables-based hydrogen, which will be piped to Orica's manufacturing site where it will be used to replace natural gas in the production of low-carbon ammonia and ammonium nitrate—crucial products for many businesses across New South Wales, including in the mining, agriculture, health and food industries. The aim is to eliminate carbon emissions from the company's existing operations. Phase one of the project produces hydrogen from recycled water and renewable electricity using a grid-connected 50-megawatt electrolyser. Collaboration with government, community, industry, academia and commercial partners is critical to the success of this project.


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18 | The crucial importance of innovation

In an address to the Melbourne Mining Club in October 2013, Orica chief executive Ian Smith stated, 'innovation is the application of a better solution that meets new requirements or existing market needs. A new idea that works.' Technology and research have long been the fundamental basis for Orica's and, before it, ICI's commercial success, but it wasn't until the turn of this century that a technical career ladder was established so researchers could stay in the field and earn appropriate money for their efforts.

The initiative came at the urging of research boss Jez Smith, with the aim of keeping as many good scientists as possible in the company and in their chosen field. Smith, a chemist by training, was in 2018 appointed emeritus chief scientist, having filled the position of chief scientist in a full-time role for the three years prior. He started in ICI's research laboratories in Johannesburg in 1980. His career at the company took him to four continents and a range of jobs, from marketing to global planning to head of research, including a five-year stint in Singapore from 2009. At the time, mining giants, including BHP Billiton and Rio Tinto, were also based in Singapore, so the post made eminent sense.

As global research head, he ran the division that developed a breakthrough in wireless detonation, WebGen™, which is a global leader in the industry. The ability to detonate explosives underground through water, air and the earth transformed the explosives sector from a safety perspective and boosted productivity dramatically. Blasting technician Luke Carlon told *Mining Technology* in May 2021, 'by removing the leads you're removing the main failure mechanism of an electronic detonator. This significantly improves underground safety as it removes the need for a person to enter an area before and after it has been fired'. The WebGen™ wireless platform has been commercially available since 2022 and has helped spur the more widespread development and rollout of wireless blasting within the global mining industry.

This technological breakthrough resulted from a global research effort by Orica. Team leaders included Geoff Anderson in Brownsburg, Canada, his colleagues Ron

Previous spread: Orica's BlastIQ™ Quarry software helps quarries optimise blasts and blast outcomes.

Operating Orica's WebGen™ wireless technology.

Stewart and Mike McCann, Dirk Hummel in Germany, and Richard Goodridge in Kurri Kurri, New South Wales, where Smith was also based.

As is common in the explosives industry, WebGen™'s development led to disputes with competitors over who developed what. Some in the industry say that a more significant development was the creation of an electronic detonator, commercialised in 1998 by Atlas Powder, the US-based arm of ICI Plc that started life as a division of DuPont. When Orica acquired the ICI Plc mining services operations later that year, it also acquired the patents for the technology.

Detonators are meant to safely, reliably and accurately initiate explosives to achieve a planned outcome. Traditionally, detonators relied on either electrical or chemical initiation mechanisms to transmit a fire command from blaster through the lead-line to the explosive charge. Both had their limitations: electric initiation was susceptible to storms and chemicals could be inaccurate.

A weighing machine used at ICI's research division.

Electronic detonators are highly accurate (through an in-built electronic clock), protected from non-specific electrical discharge through circuit design and highly reliable through 100 per cent testing during manufacture. These attributes allow significantly larger blasts, with less environmental impact, through the ability to separate each initiation event to millisecond accuracy.

There are myriad variations, but the fundamental structure is the same. A computer chip is used to control delay timing, which uses electrical energy stored in one or more capacitors to provide power for the timing clock and initiation energy. This means delay is achieved electronically, not pyrotechnically (powder). The advantages include increased flexibility, higher precision, improved blasting results and, accordingly, reduced downstream costs.

The technological breakthroughs developed in mining services are a long way from the early ICI days globally, when the company established its name in plastics, pharmaceuticals and paints. World-changing inventions included Perspex, still widely used today, and in more recent days medical protection during the COVID pandemic.

Others were beta-blockers, the first 'wonder drug' for heart disease, which is still widely prescribed. Water-based paints for cars solved the fume and flammability issues

The ICI Australia research division officially began in 1956 with the establishment of the Central Research Laboratories at Ascot Vale in Melbourne.

for early car makers, and 122 polyethylene is one of the world's most widely used plastics, in the shape of plastic bottles, shopping bags, packaging film and much more.

The ICI Australia research division officially began in 1956 with the establishment of the Central Research Laboratories at Ascot Vale in Melbourne. Its aim was to find solutions to problems and create opportunities specific to Australia. The site, the first large industrial research lab in Australia, was opened with much fanfare by Prime Minister Sir Robert Menzies. It covered the full range of the company's products, from veterinarian and agricultural chemicals to plastics, paint and explosives. The company said at the time, 'it is essential that this country has industrial centres of expertise which are capable of creating new technology as well as interpreting and applying the relevant science'.

The lab was led by David 'Dirk' Zeidler, who four years earlier had been hired from the Council for Scientific and Industrial Research (CSIR, now CSIRO). His role was research manager at ICIANZ. In a speech published in 1980 in the *CSIROOA Bulletin*, Zeidler argued, 'the generation of economic wealth will only strengthen and become more efficient if we are effective in applying what we have already learnt from fundamental research'.

In his short biography of Zeidler, Dr Peter Yule, a historian at the University of Melbourne, noted that ICIANZ began developing its local research arm during World War II. Early projects focused on veterinary and anti-malarial drugs. After the war, this work was continued along with investigations into the potential for brown coal to be used as a source of chemicals, insecticides and weedkillers. CEO Sir Archie Glenn and technology chief Len Weickhardt were impressed with Zeidler from their wartime visits to the CSIR and convinced him to join the company as research head. Zeidler's job was to develop an active research group and ensure it had the right facilities. This took him to London in 1953 to recruit staff for Australia from ICI. The research team was originally based at Deer Park in an old hotel that was renovated and expanded to include a new laboratory.

In 1962 Zeidler gained first-hand commercial experience as general manager of ICIANZ's dyes and fabric group before heading to Harvard Business School in the US to complete its advanced management program. On his return he was quickly promoted and eventually in 1973 became chair and managing director, positions he held until 1980, when at the age of 62, he reached the compulsory retirement age.

Orica's Technology Centre in Kurri Kurri, New South Wales.

He was a rarity in reaching the top corporate position from a base in science and research, in contrast to peers like his own predecessor, Glenn, and Essington Lewis at BHP, who either rose from the shop floor or had training in a related technical discipline such as engineering. His background meant that, unlike others, he knew research and development were of central importance to the company's survival.

Projects in his time included using ilmenite as a rutile substitute to make titanium dioxide for paint and other uses. ICI also looked at converting iron in the ilmenite to an iron co-product, but the downturn in the mining industry in the early 1980s put an end to the project. A joint venture with the CSIRO known as the Sirotherm project showed how industry and the CSIRO could work together. ICI Australia built a plant at its Osborne factory in South Australia that did not achieve the required reliability, but in 1984 the Perth Water Board built a desalination plant using Sirotherm technology that operated successfully for a number of years.

Big plans were also in place after he became chair, including the proposed petrochemical complex at Redcliff, north of Port Pirie in South Australia, to be built as part of a consortium with Alcoa of Australia and Mitsubishi. The plant, designed to use feedstock from the Cooper Basin natural gas fields, was envisaged as being over three times larger than the Botany plant and would have given ICI Australia genuine world-scale in petrochemicals. But the project was abandoned by ICI Australia and its partners in 1975 after inflation had caused the capital cost to soar and the economic downturn had lowered the demand for ethylene.

As an alternative, the opening of a gas pipeline from the Cooper Basin to Sydney enabled the Botany plant to be considerably expanded. The company constructed a world-scale ethylene cracker and expanded the related petrochemical plants at the site.

From the 1950s onwards, ICI in Australia made a succession of research breakthroughs of international significance. In 1957, its scientists made a breakthrough in the field of gas chromatography, which separates gas and other materials into its component parts, by developing the first flame ionisation detector (scientists at the University of Pretoria in South Africa independently made the same discovery in that year). The simple technique could be used to detect and analyse various components in gas.

Research and testing at Orica's Technology Centre, Kurri Kurri, Australia.

In the early 1960s, hydrocarbons for the plastics PVC and polythene were made by ICIANZ in two separate plants, an ethylene plant based on ethyl alcohol and an acetylene plant. Their combined capacity was 15,000 tonnes. In the 1960s the prevailing wisdom said the larger the plant, the cheaper the product, which encapsulated ICIANZ's dilemma as a capital-intensive industry in a small market.

At the time, hydrocarbons were produced overseas at plants ten times larger, with 100,000- to 200,000-tonne ethylene crackers. What the Australian petrochemical industry needed to get to the take-off point was a single plant approaching world scale. The better but more adventurous alternative was to concentrate on a single raw material—ethylene; this meant that production of PVC had to be changed. This was the alternative that appealed to the chemists. Both alternatives were pursued simultaneously.

Theresa Sonneveld has broken barriers at Orica

Commencing over three decades ago as a mobile manufacturing unit (MMU) operator in Kalgoorlie to her current role as a senior manager, Theresa has had an impressive and successful career with Orica.

When she joined the business in 1992 Theresa had no mining experience and was not licensed to drive heavy vehicles; however, her manager took a chance on her and she was trained and licensed, becoming the first female MMU operator in Western Australia—and one of the few women in the industry at the time.

Theresa loved the role, finding it both rewarding and challenging. 'I still have fond memories of that role and being given that opportunity. I met some fantastic people, worked with some amazing teams and I really loved the diversity of the job as well. I wasn't based at one site, I got to travel around working at different sites and working remotely across pretty much all of WA and throughout Queensland as well,' she says.

Theresa worked hard and learned the ropes of the industry, gaining valuable experience and leadership skills and in 1999, she was promoted to plant supervisor. She went on to work across different locations, market segments and roles, including underground manager, operations superintendent, field operations manager and operations manager. In her current role, Theresa is responsible for ensuring compliance and governance of all the mining services operations in Australia and the Asia-Pacific. She oversees the risk management, audit, assurance and legal functions of the region.

Theresa attributes her successful career to the opportunities for growth and development that Orica offers, as well as ongoing support and guidance from her leaders. She is passionate about enhancing and improving operational practices and excellence across the business and strives to deliver a positive customer and employee experience. She says: 'I have had multiple promotions and multiple roles across Australia and had the opportunity to continue to grow and develop. Working for some great and supportive leaders has been key to me wanting to continue to work at Orica and developed my passion to enhance and improve operational practices and excellence across the business.'

Theresa says that she is proud of her achievements and grateful for her experiences at Orica. She believes that Orica's longevity as a business has many elements, explaining, 'It's people, our values, the culture and diversity, and the vision of always looking for ways to improve both our customer experience and our employee experience'.

Proud to be part of Orica's team, Theresa hopes to continue making a difference in the company and the industry. 'I've had so many memorable projects and achievements at Orica, it's hard to pick just one or two. I've learned so much from my colleagues and customers—they've been amazing mentors and friends. I've grown so much as a person and as a professional. I can't thank Orica enough for giving me these opportunities,' she says.

The Villawood plant was the only place in the world where a drug, human or veterinary, was resolved quantitatively in one step on a tonne scale.

The new process of oxychlorination—in which the corrosive by-product, hydrochloric acid, is reused—could be added to the string of ethylene uses that made the Botany cracker and the Australian petrochemical industry a reality. In 1967 the first oxychlorination plant in the ICI family came online. Until this process was discovered, all acid had to be neutralised at some considerable cost and discharged as waste. Since 1967 there has been no waste and no acid pollution.

In 1968 the world's first commercial plant for the manufacture of levamisole, one of the most widely used animal drugs, began operation at ICIANZ's Rural Factory at Villawood, Sydney. Three years later a second plant, for the manufacture of tetramisole, the precursor to levamisole, was commissioned on the same site.

The Villawood plant was the only place in the world where a drug, human or veterinary, was resolved quantitatively in one step on a tonne scale. The synthesis and resolution processes were licensed overseas to the US, UK and South America, earning the company millions of dollars in royalties. Discovery and development of these processes made possible local manufacture and this, in turn, resulted in export earnings and import savings.

ICIANZ's innovations in hydraulic brake fluids received a commendation of sorts when they became the first Australian technology acquired by the parent company.

In the 1960s ICIANZ, partnering with the CSIRO, developed a new ion exchange process for the desalination of brackish and effluent waters, called Sirotherm. In 1976 the company installed the world's first large-scale plant to use Sirotherm resins in its alkali factory at Osborne, South Australia. The plant was integrated with the existing boiler feed water plant for the steam boilers and provides 600 cubic metres per day of demineralised water. More than 80 per cent of the salts in the feed water are removed by the Sirotherm plant.

Sirotherm demonstrates the importance of development from a small local market. Devised for a dry continent with brackish water, its greatest market potential turned out to be industrial water treatment and pollution control. The technologies are still being used by Ixom, which was divested by Orica in 2015 and remains a market leader in water treatment and chemical distribution in Australia and New Zealand, with a growing presence in North America and South-East Asia.

Innovation also solved a pressing problem in the explosives division. The sensitivity of nitroglycerine–based explosives and the vast distances between the main explosives factory at Deer Park and the principal explosives markets in the north-east and north-west of Australia made the explosives business a costly exercise with complex logistics. The normal solution to this type of problem—smaller factories closer to the markets—was not viable because the huge capital costs in building and protecting a conventional explosives factory would have led to unacceptable prices.

The solution in Australia lay in an entirely new product, the so-called 'water slurry explosives', which were introduced to the Australian market by ICIANZ in the early 1960s. Typically, these slurries consist of ammonium nitrate (oxidiser), sodium nitrate (oxidiser), sugar (soluble fuel), aluminium (insoluble fuel), water and a sensitising component. They represent a significant change in explosives technology as they contain no nitroglycerine or other sensitive high explosive but obtain the necessary explosive properties on mixing of compounds, which are insensitive to mechanical shock. Slurry explosives more than matched the performance of conventional explosives, while their low shock sensitivity considerably reduced the danger of accidental detonation. Headaches, caused occasionally by nitroglycerine fumes in confined spaces, are avoided.

Through the years the research department moved from a standalone division to being attached to the operating divisions, with mixed success, depending on which side of the fence you sat, as documented by Keith Neill in his 1989 book, *History of ICI Australia Research Group*.

The 200 research specialists are now split into centres of excellence attached to the operating divisions. Kurri Kurri in Australia focuses on bulk and packaged explosives and delivery systems, software and blast sensors and advanced computational blast modelling. In Denver in the US there is underground automation and computational modelling research. In Brownsburg, Canada, it is electronic blasting systems and wireless electronic blasting systems. Gyttorp, Sweden, specialises in non-electric initiation, and Troisdorf, Germany, in electronic blasting systems.

Research chief Angus Melbourne explained, 'we work together, with our customers and each other, because we believe the best outcomes are always achieved through genuine teamwork, trusting partnership and meaningful collaboration'. Collaborators have included the Singapore Agency for Science and Technology, the CSIRO, Cambridge University, Newcastle University, the Cooperative Research Centre for Optimising Resource Extraction (CRC ORE), Imdex Limited and Epiroc.

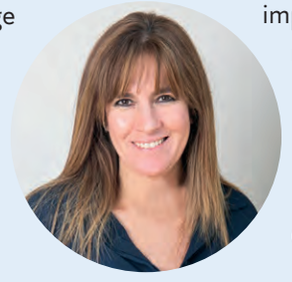
Orica stuck with its core skills in explosives, but increasingly it has focused on providing end-to-end solutions for customers. The mantra is 'the right energy in the right hole every time.' This involves digitisation to connect mining workflows to technology to help the customer predict what will happen and what is happening. One such digital offering is GroundProbe™, first developed in the early 2000s, which has a broad range of technologies to measure and monitor geohazards, such as a potential underground mine wall collapse.

The Orica innovation journey continues.

Sandra Pardo-Figueroa: 25 years of championing change

Sandra joined Dyno Nobel in 1999 as Executive Assistant for Peru and was appointed to Executive Assistant to the President of Latin America two years later. With internal communications a key area of her role, Sandra is passionate about creating a positive and collaborative work environment where people can share ideas, feedback, and achievements.

Sandra has supported eight presidents and participated in many key projects involving change and communications.



What are your most memorable projects or achievements?

I have participated in many changes with Orica, including mergers and acquisitions in our region. The most memorable projects include the Dyno Nobel acquisition in 2006, where I was able to participate in a cultural change program; and Exsa acquisition in 2020, where we implemented a communications plan to support the integration process, enhancing employee engagement, alignment, and recognition, and ensure relevant information was provided to employees.

A key milestone during these years, was the establishment of a network of Internal Communications Ambassadors that fostered, and continues to foster, a collaborative and inclusive environment, integrating different cultures and perspectives, aligned to our core values and strategy.

What skills or competencies have you developed on, or improved?

After completing my business administration diploma, and HR diploma, I began working more closely with management and took on responsibilities as Internal Communications and Human Resources Coordinator in addition to my role.

My passion for communications has led me to further my knowledge of graphic design and communications strategy. The years of experience and the fact that I had the chance to get to work with people from diverse backgrounds and different levels of management has enriched my soft skills, which are key to my role.

My journey has involved commitment and dedication, respect, resilience, excellence, and professionalism. I have learned a lot from my colleagues, and I have grown both personally and professionally. In addition, I have a wonderful administration support and internal communications team.

How has Orica changed over 25 years?

Orica has become a truly global organisation. From different names, acquisitions, divestitures, to the improvements in technology and innovation. During this time, Orica has implemented environmental care targets aimed to reduce its environmental footprint and contribute to a more sustainable future – and with a stronger commitment to diversity and inclusion. The most remarkable thing is that through all these changes, when it comes to its core values, Orica has been solid as a rock.

What do you appreciate about the culture?

Orica is always setting new goals towards becoming a more modern, resilient, and diverse company. It sets standards that others try to follow, but the DNA of Orica is unique. It is a company that does, and lets you do and be yourself. This cannot be found easily.

Orica continues to value its people by providing the best place to work and opportunities for professional development. The company values its customers by striving for excellence and innovation through its core values of safety, teamwork, accountability, integrity and respect.

What has been your favourite moment?

I have many favourite moments. When I talk to people outside of the industry they recognise Orica as a global explosives leader, and that makes me feel proud.

I was recently awarded the bravO LATAM Award for Excellence in 2023 by employees across Latin America and there is nothing better than receiving recognition from your colleagues. I am just as passionate about serving my internal customers as I was 25 years ago.

What are you most excited about for the future?

I am excited about how technology is providing new ground to discover safer and more efficient ways to do things. Orica's goals set year on year will continue to have a positive impact, including the environmental goals focused on the planet and people's lives. There are no limits for Orica.

19 | Malcolm Broomhead on culture change

When the Orica board was looking for a new chief executive in 2001, former North Limited chief executive Malcolm Broomhead's name was high on the list, being well known to Dr Michael Deeley, who was chair of North Limited when it was taken over by Rio Tinto in 2000. Orica chair Don Mercer was also on the North board.

Broomhead didn't fancy staying on at Rio and was looking for a turnaround opportunity. In 2001 Mercer, in the wake of a growing crisis of confidence in the company with its stock price at one third of the previous year's levels, had a roundtable with advisers McKinsey and others where the merits of a change were discussed.

Orica's stock price had slumped to as low as $3.74 a share and the market was demanding change. The opening represented a perfect opportunity for Broomhead.

He was chief executive from 2001 to 2005, when he stepped down for health reasons and served as chair from 2016. The following extracts are an edited version of a chapter he wrote for a management textbook, *Speed@Work: How Velocity, Turbulence, Fast Growth, Rapid Change and Strategic Agility Affect Business and the Workplace*, published in 2012.

He had worked in management positions with Halcrow (UK), MIM Holdings, Peko Wallsend, Industrial Equity and North Limited and was taking a break in the UK when first approached for the Orica position. Broomhead also had the benefit of some inside knowledge of his new company, outside the board connections, with North's relatively recent recruit John Watt as human resources chief. Watt was a 20-year veteran of ICI/Orica before taking on the North position.

While mining companies were key clients of the explosives firm, the two sides often had different views of each other's importance to their success, with the latter working on a rule of thumb that they accounted for 5 per cent of a miner's costs and added 30 per cent in value.

In Broomhead's view, in 2001, Orica was like an aircraft plummeting towards the earth. There was no time to wonder if this was the right aircraft—in other words,

Previous spread:
Malcolm Broomhead AO.

Orica Digital Solutions employee developing smart explosives delivery control systems.

whether the current assets or strategies were the correct ones. The prime objective was to pull out of the dive, fix the immediate problem, stem the cash flow bleeding, increase productivity and improve the businesses it already had.

'In 2001, the company's share price had fallen from $13 to $4,' he wrote. 'A hostile party [Wesfarmers] had started to buy our shares, the company's cash flow had reduced to a point where we were in danger of having our bankers withdraw their support, and competitors were beginning to significantly erode our market share in our major business.'

Centaurus adviser Tim Burroughs had told the board the restructuring, which started under Philip Weickhardt, was like a rabbit crossing a six-lane highway: once it made it across, all was good, but there were real danger points along the way. These included the global economy, commodity price fluctuations and an earnings shortfall flowing from the asset sales.

Broomhead continued, 'the story that followed is an inspiring one, in which 11,000 people, across 45 countries, significantly changed the way they approached their jobs, in the process turning Orica from near destruction to one of the success stories of Australian business'. Orica, he said, aimed at a 'deliver the promise culture'.

Simply having a chief executive explain the metrics to everyone in the company had a real impact. Now staff understood how just small improvements in profit could do wonders for improving returns.

'The company's first move', wrote Broomhead, 'was to stop pouring in the cash. In fact, we turned off the money tap and concentrated on improving the return on the

funds already in the business. We set a target—an 18 per cent return on net assets. Each of the business units was required to achieve that return or we would either sell that business unit or close it down.'

At the start of the process, only one of Orica's 14 business units was achieving an 18 per cent return. Two years later, almost all 14 businesses were exceeding that target.

The figure of 18 per cent was based on the following logic.

- Assume that you buy a company with assets that are worth $100. You might fund, say, 35 per cent of that purchase through a loan from your bank and you, as the shareholder, would put in the other 65 per cent.
- If the business earns an 18 per cent return on its $100 worth of assets, the $18 of profit would be distributed as follows:
  - > $2.50 would go to the bank to pay interest (assuming a 7 per cent interest charge on the $35 you borrowed);
  - > roughly another $2 (or 2 per cent) would be required to run the company and for investment in environmental, safety and other developments that are not earning any money at that time; and
  - > tax on the remaining $13.50 (assuming a tax rate of 30 per cent) would be $4, which would leave $9.50 to be distributed.
- As an investor you should require a better return from a riskier equity investment than you would get from the relatively safe option of putting your money in the bank. This so-called 'risk premium' is generally assumed to be about 6 per cent, so if you could get 4 per cent from bank deposits then you would require about a 10 per cent return on your equity investment to compensate for the greater risks you are taking.
- In other words, you would require $6.50 per year from the $65 you had invested in our $100 company.
- Having therefore paid interest, funded the running of the company, met our tax bill and given the investors their minimum return, we are now left with $3.50 from the original $18 invested in the company. This represents a 3.5 per cent return on the original $100, which coincidentally is about the level of inflation at the time of writing. In other words, by reinvesting the $3.50 in the company, the assets will increase in value from $100 to $103.50, thus keeping pace with inflation.
- In this example, interest costs, minimal running costs, tax and inflation are all givens, which simply must be covered. Therefore, if the business produces less than 18 per cent, the only place that the shortfall can come from is by giving a lower return to the investors.
- In a public company, investors will then sell their shares and put their money elsewhere. This was the core of Orica's problem in 2001.

The demand for each of the business units to earn an 18 per cent return was not an aspirational target but a compulsory one. By running through the simple logic described above, every employee on the Orica team, including shopfloor

An operator in cab of Orica Mobile Manufacturing Unit (MMU).

factory workers, could understand why that target was mandated and could work towards achieving it in their part of the business.

By working from the answer backwards, people may be presented with targets that seem very difficult to achieve and yet, when it is explained clearly that there is no option but to achieve these targets, it is amazing how people will find a way to reach the goal. In Orica's case, we were asking our people to improve profitability by over 400 per cent! It was important that they understood why that demand was being made before they could be expected to truly commit to achieving it.

In our first year of the Orica turnaround, the efficiency targets that came from working backwards from our 18 per cent goal were daunting; however, we achieved them, and our underlying profit improved from $60 million in 2001 to $270 million two years later.

In addition, most of the improvements came from the only area we could truly control ourselves, which was our internal costs.

Most of the early productivity improvement at Orica was, therefore, a result of cutting overheads and excess levels of bureaucracy. While this inevitably involved job losses, which included making tough and painful decisions, the result was a freeing up of the company and the empowerment of the remaining employees to take control of their own responsibilities. This inspired people and led to greater enthusiasm and motivation throughout the group.

The imperative for short-term performance is always with us. Don't ever fall for the old line that 'a poor result plus a good excuse is an acceptable outcome'. It isn't!

An email was sent to all staff with the headline 'no more dopey deals', which was a reference to some poor loss-making explosives contracts in the US, which were done in fixed-price terms, leaving Orica with all the downside and none of the upside.

To avoid this problem in Orica we assembled a full-time team of four people devoted to ensuring each part of the business achieved its monthly target. As soon as a business unit started to drift off the mark, this team was available to bring all the resources of the organisation to bear in helping them to get back on track.

The team was headed by Shawn O'Sullivan, who came from North Limited to join Broomhead at Orica and included three longer-term staff in the company. The three stood out, having earlier gone to the chair, Don Mercer, to express their misgivings about where the company was headed, before Broomhead was appointed.

Broomhead said, 'in looking at short-term performance, I believe the role of the leader is to stretch the organisation. People love to be challenged—to reach the unreachable goal. It invigorates them and builds their self-confidence. In pursuing performance improvements, the big lesson I have learned in my career is to be bold and to make big step changes but to involve your people in setting those targets'.

An email was sent to all staff with the headline 'no more dopey deals', which was a reference to some poor loss-making explosives contracts in the US that were done in fixed-price terms, leaving Orica with all the downside and none of the upside.

This put everyone on notice.

For Broomhead, the role of a leader is to:

1. Set the targets. Remember to stretch the organisation, keep raising the bar—'Today's record is tomorrow's budget'. In fact, in a culture of continuous improvement every new result must be a record.
2. Articulate the targets and the reasons for them to everyone in the organisation. Communication is a vital role of the leader and the old adage 'When you are becoming heartily sick of hearing yourself say the same message, then your audience is probably just beginning to get it' certainly holds true. Most people in an organisation are happy to stretch themselves to achieve the required results, provided they clearly understand what those expected results are.

3. Ensure that the organisation is always on track to achieve the targets. This can be done using a dedicated team, such as we did in Orica, or by direct management of the operating team. In an environment of constant change, it often happens that your current approach is insufficient. If this happens, change the approach but always hold the target sacrosanct. Speed is extremely important in obtaining short-term goals. Don't spend too much time trying to ensure that the approach is perfect; '80 per cent right and done' is better than '100 per cent right and not done'.

The four areas critical to a leader are:

1. short-term performance, which centres on efficiency
2. culture, which is about the way in which people in the business behave
3. strategy, which is about the long-term direction of the organisation
4. communication and relationships, which are about aligning all the stakeholders to the chosen direction.

I believe culture is the most unrecognised area of leadership in business today.

Culture is simply the important behaviour and principles that are necessary for people to follow in order to deliver the organisation's strategies and goals. The way people behave in any organisation is often not talked about, but I believe there is great power in making the required behaviour explicit.

This means that people are quite clear as to what the company expects of them and what they can expect of the company. Once people are clear about these issues, it builds trust and develops ownership and alignment among all employees.

Whether people are working in Mexico or Estonia, Chicago or Gladstone, they must be on the same page and a defined culture helps them achieve that. In addition, trust and clarity make it easier for people to share ideas and resources with their colleagues. This breaks down silos and adds significant value to the organisation.

The key to ensuring commitment to the culture is to involve all employees in formulating that culture.

Broomhead spent three of his first six months as CEO of Orica going around the company across the world and asking employees:

- What do we do well and what don't we do well?
- If we want to be the best company in the world, what are the three or four things that we must get right?

The answers were surprisingly consistent across and up and down the organisation. We assembled this huge amount of data then took a representative vertical slice of employees who came together and distilled that data into four types of behaviour.

The behaviour we came up with in Orica is outlined below, as part of Orica's 'deliver the promise culture':

1 Safety: Take care of yourself and others. Meet the needs of our customers and the community in an environmentally sustainable manner. Always improve our safety, health and environment performance.

2 Commercial ownership: Run the business as if it is your own, achieve great financial results. Relentlessly pursue the best business outcomes, adopt a vigorous approach to costs.

3 Creative customer solutions: Think differently, deliver swiftly and capture the value. Help your customer succeed; deliver the best solution, not always the perfect solution; always seek a faster and better way rapidly respond to opportunities and change.

4 Work together: Success as a team and success as an individual. Clearly communicate expectations; recognise and reward achievements; hold ourselves and each other accountable; help others to be successful—no silos; never stop learning; treat others as you want to be treated; respect cultural diversity; behave with integrity. Be part of the solution—can do!

None of the Orica behaviour was in any way unusual; however, what was important was that these behaviours were derived from within the organisation and therefore had a very strong sense of ownership from all employees. This was their culture.

Of all of the behaviour, the one that led to the greatest change within Orica was the concept of 'running the business as if it is your own'. To illustrate the changed mentality in Orica, people took responsibility for delivering the outcomes and became incredibly creative and resourceful because they truly saw the company as their own.

In Orica's case, our culture of 'running the business as if it is your own' tied in with our efficiency and short-term performance goals. Both required a substantial reduction in bureaucracy, which of course is an ongoing battle in a large organisation. We formed a 'bureaucracy busters' team, which was constantly looking to eliminate unnecessary reports, clunky systems and complex approval mechanisms throughout the company. It is amazing how many thick reports are generated that never get read.

To make long-term progress, to get real traction, there is a need to mesh the culture with the performance-management system. This is where the rubber really hits the road. It is important to hold people accountable, both in a positive and negative sense, because, after all, what gets measured gets made.

At the end of the day culture is all about the people in an organisation taking ownership and accountability for their jobs. This is the key to unlocking their genius and enabling them to achieve extraordinary things. That, in turn, is the key to leadership.

I believe that the change in Orica's culture was the main reason the company turned around so successfully, as reflected in the share price, which rose from $4 to $20 within three years.

Value creation is the reason businesses exist. At its most simplistic, value creation is about earning more money for the owners of a business than

Ammonium nitrate prill produced by Orica for use in commercial explosives.

they could make by leaving their money in a bank. In achieving this goal over a sustained period of time, successful businesses must create value for their customers, for the community and for their employees. If any of these three groups deserts the business, it will fail. By successfully creating value the owners, customers, community and employees will all benefit, prosper and grow together.

Speed is crucial.

People on the spot must act quickly and decisively to take advantage of the change in the situation. If they are clear about the behaviour and the performance targets required, they are free to act without uncertainty.

In terms of the pace of change at Orica, we had completed the meetings with thousands of employees across the company, analysed the data and brought the focus group together to create the 'deliver the promise' principles within six months of the start of the turnaround.

The company now had its short-term performance goals and required behaviour in place and was fully ready to deliver the remarkable recovery that followed.

Having fixed the short-term performance issues and embedded a strong culture in the organisation, the final plank in our successful turnaround was to determine the long-term strategy for the company.

Strategy may involve a major change in direction but in Orica's case the existing businesses were basically sound, which meant there was no need for urgent action on the fundamental make-up of the portfolio. Our strategy was therefore built around three main principles:

Orica before 2001 was focused on growth rather than the economic performance of its existing businesses.

The management of a poorly performing business will often buy another business in the hope that the increased revenue will provide a life raft but, as they say, two rocks tied together still don't float. At Orica, our initial strategy was to ensure that businesses achieved a satisfactory return (in our case the 18 per cent return on net assets) before we invested additional money in growing that division. In other words, businesses had to earn the right to grow.

If you are the leader in your industry, you should be able to outspend your competition on research and development, marketing, and capital expenditure and thus enjoy the lowest-cost position, which enables you to be more competitive in your market pricing. That, essentially, is the power of market leadership.

One of the reasons some Australian companies do not do well offshore is that the global markets are so much larger than the Australian ones. In Orica's case, our commercial explosives business operated in a world market that was relatively small; therefore, we were able to establish ourselves in the number one position.

The third growth principle at Orica was growing close to the core of business. Research shows that focusing on related growth close to the core of existing businesses is a far more successful strategy than large step-outs into unrelated businesses. Again, this is common sense: growing what you know is always going to be less risky than buying into a completely unknown area of business where your competitors are likely to have far more market knowledge than you.

Orica started to grow its existing businesses through plant expansions, industry rationalisations, bolt-on acquisitions and moving into new geographies. For example, we merged the two major Australian fertiliser businesses, Incitec and Pivot, and more recently the company has purchased a significant portion of its main global commercial explosives competitor, Dyno Nobel.

In Orica's case, the summit is long-term value creation and there are many ways to achieve this. In times of change it is often necessary to change a strategy. The key is to choose a sensible strategy and to execute it well. Good execution is fundamental to business success.

Communication, and the relationships that flow from it, can take up to half of your time as a business leader but is absolutely vital in ensuring that the company is headed in the right direction and that all the stakeholders are on board and supportive of that direction.

Broomhead's strategy worked. The company reported a massive turnaround in profit in the 2002 financial year of $214 million against a $193 million loss in 2001.

An Orica Mobile Manufacturing Unit in Canada.

Resilience or persistence? The story of Felix Torres

Persistence and resilience are two important traits to possess in life, although they are often misunderstood or used interchangeably. Persistence refers to the firmness in pursuing a goal, while resilience is the ability to recover from adversity and find new solutions to reach the same goal.

'In my own life, I experienced a defining moment when I was determined to work at the Orica Research and Development Centre in Canada. Although working abroad was not a common pursuit at the time, I was driven by my unwavering persistence and determination to achieve this goal. I was fortunate to have the support of my mentor, Gilberto Sampaio, who helped me make connections in Canada. Despite the challenges and obstacles along the way, I was able to overcome them through my resilience.

'When my request for sponsorship was denied by the area director, I did not give up. Instead, I took the challenge of self-sponsorship, sacrificing my personal belongings and saving every penny to make it a reality. During my three-month stay at the Technical Centre, I immersed myself in the world of ammonium nitrate and emulsions and made substantial contributions to the field. With the help of knowledgeable managers and scientists, I was able to develop a cost-effective emulsion solution and present my findings to Dr Joe Urenovitch, the Vice President of Research and Development at that time.

'My experience at the Technical Centre marked a turning point in my life and sparked a passion for continued learning and exploration. Through my persistence and resilience, I was able to make my vision a reality and continue to grow in my field.'

20 | A disposable luxury: Orica art

By the early 2000s Orica was in trouble, with its profits and share price down. The company had inherited a 486-piece art collection from ICI Australia. Was it justifiable for the company to retain an art collection worth millions at such a crucial time in its history?

In July 2001, just five months after starting as Orica's chief executive, Malcolm Broomhead set the Australian art world alight with the sale of the collection for $13 million to billionaire Kerry Stokes. The aim was not so much to be a talking point in the art world but to draw a line in the sand and signal the new corporate culture at the company.

Broomhead told *The Age* newspaper at the time, 'the sale is further evidence of Orica's commitment to capital efficiency and is also an important symbol of cultural change reinforcing our focus on effective shareholder value ... These things have to be done, especially when you are asking people to make big sacrifices'.

Broomhead later wrote in a management textbook that in his office alone there was over $2 million worth of art on the walls. 'I thought it was an important symbol to dispose of that luxury at a time when we were imposing austerity across the business. Although in dollar terms this sale was not significant, it sent a powerful message about the intentions of the company'.

The collection had been started by ICI Plc as a sign of its support for Australian culture. It was put together over a 35-year period from 1957, with advice and help from national and state galleries and also from Clifton and Jane Pugh, Joseph Brown, Chris Deutscher and John Jones. The intent was to show the history and evolution of artists and movements and, in particular, items by artists who have made significant contributions to the development and reputation of Australian art. The works included selections from some of Australia's best artists, including Brett Whiteley, Sidney Nolan, Arthur Boyd and John Brack. Arguably the single most valuable painting was *Portrait of Maria* by Russell Drysdale.

The collection was the subject of the landmark book *A Story of Australian Painting* by the National Gallery of Australia's former head of Australian art, Mary Eagle, and

Previous spread: Malcolm Broomhead AO with Orica's art collection prior to sale in 2001.

curator John Jones. In the preface, ICI Australia chair Colin Short said, 'the company decided to bring the ICI collection to the people through a publication with the object of providing a richly illustrated and accessible text for the benefit of art lovers and students in the wider community'.

By 1992, the collection was seen by experts as a reasonably well-rounded and capable outline of Australian art history from the early nineteenth century. The emergence of contemporary Aboriginal art and the newer generation of artists was said to be beyond the scope of the collection. Even so, the company's intent to showcase the work and evolution of Australian artists was clear.

From the perspective of ICI Australia and the parent company, the collection was intended as a sign of its commitment to the community. This meant the sale was not without controversy, the collection being regarded as arguably the best Australian art collection in private hands.

The new chief executive used the sale as a potent symbol to show the world the 'new Orica'. In Broomhead's office, an Arthur Boyd masterpiece was replaced by a framed poster-sized print of Orica's corporate values signed by all the senior executives.

The sale was tested with the big art auction houses, which reportedly baulked at the price the company was seeking. By selling the work privately to Stokes the company won few friends in the auction houses, which missed out on lucrative commissions. Orica reported a $27.6 million financial gain on the value of the artwork in the company's books.

Other companies have taken a different view of corporate collections. Wesfarmers chairman Michael Chaney, for example, has argued that art collections are good investments, part of being a good corporate citizen and good for staff morale. Wesfarmers hangs much of its collection in its head office, which was modified to provide gallery-grade climate control and security.

21 | Sanjeev Gandhi: Beyond blasting

Sanjeev Gandhi was appointed Orica's managing director and chief executive officer in April 2021. He soon championed the company's expansion into digital solutions. It was part of what Gandhi called 'beyond blasting', taking the company past its explosives base to become an integrated resources services company.

In 2023 digital solutions accounted for just 10 per cent of earnings, but hopes were high that in the years to come the division would be a major driver of company earnings. Within the company the idea was not new, but the difference this time was that the company had the brand equity and scale to deliver it and, in Gandhi, a chief executive with the ability and vision to deliver it. He inherited a company well positioned in the market and with first-rate executive leadership. What was needed was tweaking, not a complete overhaul.

Few companies last for 150 years and chief executive Sanjeev Gandhi sees no reason why Orica can't last another 150 years. He has spent his career working for corporates, notably chemical group BASF, which had made the distance by adapting to new markets.

Gandhi argues Orica has huge advantages. It has stuck to its core; it is domiciled in Australia where it has a strong base; it is a world leader and so has scale; and yet it is also moving beyond its core to create the world's biggest resources services company.

Orica, he argues, has a unique advantage in knowing what customers want, making it easier to deliver them new services at a time when technology is changing global industries. Every day Orica has 10,000 people at mine sites around the world, operating in over 100 locations from 35 manufacturing sites.

The executive leaders reporting to Gandhi are skilled and experienced. He meets with the global team every fortnight to understand what they need and how they are going. The simple strategy allows workers as well as investors to understand the company.

The oil and gas industry is already well served with the likes of Schlumberger and Halliburton, but Orica has no peers in the resources industry. It covers the process

Previous spread: Orica's Managing Director and Chief Executive Officer, Sanjeev Gandhi.

Members of Orica Board and Executive Committee visit Kurri Kurri in February 2023. Standing row (left to right): Bertus Devilliers, Vice President Continuous Manufacturing; Kim Kerr, Chief Financial Officer; Gene Tilbrook, Non Executive Director; Mark Garrett, Non Executive Director; Gordon Naylor, Non Executive Director; Paul Hastie, Kooragang Island Manufacturing Centre Manager; Germán Morales, President Australia Pacific; Leah Barlow, President SHES, Discrete Manufacturing and Supply. Seated row (left to right): Malcolm Broomhead AO, Chairman; Sanjeev Gandhi, Managing Director and Chief Executive Officer; Karen Moses, Non Executive Director; John Beevers, Non Executive Director.

from start to finish. Plenty of companies are involved at one or more levels, including some customers, but none are fully integrated.

The company's new division, digital solutions, was established in 2023. It houses the assets aimed at leveraging the company's global leadership in blasting through the full value chain, covering services and software and is one of four verticals, along with mining services, quarry and construction, and chemicals. The division is run by Rajkumar Mathiravedu, who joined the company in 2017 after a long stint at Schlumberger, where he worked with his boss at Orica, chief technology officer Angus Melbourne. Interviewed for this book, Mathiravedu said the starting point from his perspective was 'The downstream impact of variable and poorly controlled blast outcomes can impact as much as 80 per cent of total mine processing costs'.

The integrated strategy is a combination of digitisation, automation and electrification. Step one is to understand the orebody. Knowing the miners don't go to work until the blasting is done, it is critical to do the right blasting. This works best by understanding the geology and using specialty services like GroundProbe™, which uses laser technology to test the strength of mine walls. Stage two is blast design and execution, and stage three is monitoring, to work out what happened after a blast.

The underlying concept is: the more you understand the resource, the better blasts you will have; the more data on the process, the more benefits you garner, and the better service you can deliver.

Orica has technology centres in Brisbane, where GroundProbe™ was headquartered and the geotechnical team sits, as well as separate teams in Kurri Kurri looking at

blasting techniques and in Perth focusing on orebodies. The endgame is to create new sources of revenue to take the company forward.

For much of its history Orica had a tense relationship with the major resources companies, based in part on the fact that Orica as market leader in explosives was perceived to take them for granted. The beyond blasting strategy was aimed at changing that by working with customers.

Ironically enough, as things stand, potential competitors often just happen to be the customer in the case of the big tier-one mining giants like BHP and Rio Tinto. This means the services Orica offers need to be superior. These services are also offered on a platform, which means customers can pick and choose and do not need to take one to get the rest. This policy is seen as crucial, especially when selling the services to customers who do not use Orica explosives. Around 20 per cent of customers are serviced by rival explosives or chemicals companies, but obviously where possible the Orica team offers the full suite of products and services. The digital solutions team has about 750 people, with 220 of them based in Australia. As with all products, local knowledge is key with the backing of the global resources team.

Orica also took an early lead in new technologies, as evidenced by the Origin Hydrogen Hub joint venture, located next to Orica's Kooragang Island manufacturing site in Newcastle. The project was launched at Kooragang Island by the Minister for Climate Change and Energy, Chris Bowen, in August 2023. The hub has the advantages of a strategic location at the Port of Newcastle and an established end market—the Orica ammonium nitrate plant. Origin led the Hydrogen Hub design and development, and Orica was the foundation customer. Other hydrogen ventures are scattered across the country. The federal government hopes the hubs will form the basis of a new national industry. At first the joint venture will supply just 6 per cent of Orica's needs as fuel for its ammonium plant, but if hydrogen has a future as an export this is arguably best achieved as ammonia. This is seen as the best way to transport hydrogen.

Orica has used so-called grey hydrogen (hydrogen produced using natural gas) at the site for much of its 50-year history, but the new process is aimed at producing desirable green hydrogen—produced by renewables—to progressively replace natural gas as the feedstock in making ammonia. The displaced natural gas from the project would free up enough gas to power 50,000 homes in the state.

As to its progress, Gandhi has an open mind. Other industrial and transport uses for green hydrogen beckon, such as trucks and buses, but at the moment he believes more government support is needed for the expansion. He argues the plant is not yet commercially feasible on a standalone basis. To place the task in context, to fully decarbonise ammonium manufacture at Kooragang would require 64,000 tonnes a year of hydrogen and a 1050-megawatt electrolyser. The Origin deal is for just 50 megawatts.

The electrolyser sources electricity from the national grid, which is still mainly coal powered, but Orica is on record as saying that by 2040 it will use solely renewable fuel, and has an ambition to achieve net zero emissions by 2050. These are bold claims given the industry is classed as emissions intensive.

Hydrogen and decarbonisation are key strings to Orica's bow. It is future-proofing its local manufacturing operations and its supply chain. The 2023 decarbonising of the nitrogen plants at Kooragang Island is another example, achieving multiple benefits:

Decarbonising the three nitrogen plants at Kooragang was completed using technology known as EnviNOx®, supplied by German steel producer ThyssenKrupp Uhde—the same company behind the project at Carseland in Canada.

meeting the company's own environmental commitments, making the company a more marketable supplier to customers who want to meet environmental, social and governance (ESG) commitments, and opening the possibility of another revenue leg.

Decarbonising the three nitrogen plants at Kooragang was completed using technology known as EnviNOx®, supplied by German steel producer ThyssenKrupp Uhde—the same company behind the project at Carseland in Canada. The Kooragang project eliminates approximately 567,000 tonnes of carbon dioxide equivalents from the site each year, equal to the annual emissions from 50,000 Australian homes. This reduction in greenhouse gas emissions corresponds to 48 per cent of Kooragang's total greenhouse gas emissions and 11 per cent of all chemical industry emissions in Australia.

Gandhi said in an interview for this book that it also shows 'emissions reduction is possible in hard-to-abate industries of our economy'. Decarbonising the manufacture of ammonia is another step towards producing green hydrogen, both for use in Orica plants and potential external sales.

The EnviNOx® technology works by breaking down nitrogen dioxide—commonly known as laughing gas—into its harmless components, nitrogen and oxygen, by a means similar to catalytic converters placed on car exhausts. The exhaust gas purification was easily integrated at the end of the nitric acid production process. This was a relatively small step for the plant operator, but a big one for climate protection. Decomposing 1 tonne of nitrogen dioxide into nitrogen and oxygen has the same effect as reducing 265 tonnes of carbon dioxide. An earlier, more complex process was used to help decarbonise the Orica Carseland site. When the project at Kooragang was completed, the EnviNOx® technology was then applied to the Yarwun plants near Gladstone.

Gandhi pushed for early consideration of a hydrogen domestic reservation system so that local industry has access to supply. This is akin to the model that succeeded in Western Australia for gas but was considered too late to introduce in Australia for east coast gas. Throughout its history Orica has been plagued by high gas prices and here was an early chance to finally rewrite the rules. Whether the government will come to the party is too early to tell, but Orica is at the front of the line with a new technology. Orica argues this will give Australia the best chance of establishing a robust domestic renewable hydrogen and ammonia industry with export and global scale while thriving in a lower-carbon world.

Hydrogen is difficult to transport, which is why the Kooragang Island project is well placed. It is the only ammonia plant operating on Australia's east coast with direct access to a deep-water port and the Port of Newcastle's Clean Energy Precinct.

The resources industry has a handful of tier-one companies but hundreds more in tiers two and three, meaning there are myriad opportunities in different geographies. Take China for example, where Orica has a joint venture with the Beijing-based Poly Group.

Orica has been in China since 1997, just before ICI sold out of the Australian company, in a series of ventures pioneered by explosives boss Peter Clinch. Three entities were established in mainland China to provide commercial explosives, initiating systems, blast-based services, and mobile mixing and charging units to a range of customers.

Poly—which in some respects mirrors Orica—is a large-scale civil explosives enterprise group offering integrated products and services. A national leader in electronic detonators, it looks to Orica to lay a firm foundation for future development. It is also, according to the company's website, 'committed to becoming China's No.1 and the world's leading comprehensive service provider of explosives and blasting engineering solutions, offering total-solution products, technologies, and blasting services to the global market'.

Another leg to the expansion lies in future-facing minerals, which need greater purity than the 65 to 70 per cent required for, say, iron ore. Lithium, graphite, copper and rare earths are key commodities in the renewables revolution, and Orica was initially short on expertise to catch the wave. Processing these minerals requires more organic chemicals, some of which Orica had sold in earlier cleanouts and needed to be resurrected. Orica's main exposure at the time was to leaching agents and emulsifiers, with cyanide making up its biggest product.

Still, chemicals chief Adam Hall is positive about potential growth opportunities in cyanide, explaining that demand for cyanide is expected to outpace the predicted growth in gold ore treated to 2026 as the complexities involved increase. He said the Yarwun facility has great brownfield growth opportunities around the site. As well, some customers who have tried alternatives to cyanide have run into cost blowouts, which has led them to return to Orica.

Emulsifiers, which maintain stability of the explosive mixture, represent a small but highly valuable part of the company's product mix. Hall explained the 'secret sauce for emulsifiers' was the key ingredient for Orica, providing some product differentiation.

Hall cites flotation reagents—chemicals used to separate substances based on their physical and chemical characteristics—as a big growth opportunity, given their increasing use by the big miners. This opportunity could involve partnering with chemical companies, with Orica's knowledge of mining-customer needs as its differentiating skill.

Gandhi expresses determination to fill the gap on future-facing minerals. But in contrast to Western Australian conglomerate Wesfarmers, which acquired the Kidman Resources lithium deposit in Western Australia, he has no plan to actually buy the commodities, arguing this would mean competing with customers. The strategy mimics that employed in the early days of ICI in Australia as it sought partners to develop its business.

Managing Director and Chief Executive Officer Sanjeev Gandhi and Chairman Malcolm Broomhead AO.

Gandhi told the Melbourne Mining Club in June 2023, 'My ambition is to get access to a portfolio of mining chemicals that help in the extraction and purification of future-facing commodities … There's a lot of chemistry that goes into copper purification, nickel purification, lithium … to convert ore into usable product is all chemistry. And that chemistry is what I'm really looking for in terms of growing my portfolio'.

He was equally sure this was the playing field in which Australia would best prosper rather than manufacturing complete batteries, as some advocated. As the world's battery supply chains take shape, Australia needs to focus on what it does best, Gandhi said.

To fill in the gaps in the company's portfolio, strategy chief Andy Stewart and his team of four analysts screened 50 potential targets in the first six months of 2023. Gandhi looked for more product that might be obtained by way of a licensing agreement, acquisition or joint venture. In an interview for this book, Stewart said the screening started with 'the usual disciplined financial assessment for our shareholders (EPS accretion, returns above our cost of capital, etc.), looking for mining chemical targets that enable one, ore processing, two, chemical stabilisation and/or three, recovery and treatment'. Targets were weighted more favourably if they were associated with process technology for future-facing commodities that also delivered better ESG outcomes than the traditional way of ore processing.

One example of the end result of this screening is the 5 per cent stake Orica acquired in Alpha HPA, which has proprietary technology to process aluminium into high-purity alumina. Orica supplies the reagents to Alpha for use in its aluminium purification technology and takes the offtake. It creates value and cuts waste, ticking all

In 2022 Orica completed its acquisition of Axis Mining Technology, a leader in geospatial technology. The $260 million deal accelerated Orica's capabilities to support new mineral discoveries required for decarbonisation.

the ESG boxes. The two companies also signed an agreement to look at the possibility of establishing a new high-purity aluminium manufacturing facility in North America.

Another early-stage project was the METS Ignited funded partnership. The partnership between Orica, IMDEX, Anglo American, Teck Resources and the CRC ORE focused on a material characterisation project for optimised blasting.

Orica also invested in and worked with Silicon Valley start-up DataCloud and its RHINO Seismic-While-Drilling system. This real-time subsurface measurement technology provides high-resolution rock mass data through vibration measurement on internet of things (IoT) sensors. It enables accurate detection of faults, fractures and joint spacing, in addition to many grade indicators and blast-critical measurements.

In 2022 Orica completed its acquisition of Axis Mining Technology, a leader in geospatial technology. The $260 million deal accelerated Orica's capabilities to support new mineral discoveries required for decarbonisation. New mineral discoveries are increasingly located at greater depths and demand more precise geophysics. Axis's gold and copper exposure also complement Orica's broader commodity mix objectives. This was a valuable addition to Orica's digital solutions platform, creating a leading full-service orebody intelligence business that helps position Orica to become the industry's first integrated, end-to-end, mine-to-mill solutions provider.

Gandhi's vision statement is underlined by his comments on the deal. 'Orica's purpose is to sustainably mobilise the earth's resources, and achieving this starts with a better understanding of the orebody at the start of the mining value chain. I believe that Axis's differentiated geospatial tools and instruments, combined with our existing suite of digital solutions, will provide compelling orebody intelligence to customers and support the delivery of the industry's first end-to-end solutions platform, from mine to mill.'

The new beyond blasting chapter in Orica's history is fast evolving. Gaps in the company's portfolio are being identified and will be filled as and when appropriate. Watch this space.

Meet Senior Scientist Stefan Sixtensson

Deep in the Swedish countryside lies Orica's world-class research and development facility, in the small town of Gyttorp. Every day here, important work is being done. It is here where the shock tube and non-electric detonator products were first invented and launched. Detonators have been manufactured at the Gyttorp plant for some 80 years, and today it is the only manufacturing site in the Nordics.

Behind much of the day-to-day work is Stefan Sixtensson, a senior scientist within Orica's manufacturing technology division. Stefan has over 30 years of experience, having spent his entire career with the company. He has worked across research and development, manufacturing excellence, quality control, and safety, health, environment and security (SHES), and has an unparalleled breadth and depth of knowledge of commercial explosives.

Stefan's career proves how behind every great company, there are many hardworking, dedicated people. As much as Orica is an explosives company, it is also a technology company, and Stefan knows the value of turning the science into business.

What did you study at university?

I studied chemical engineering at university and they had us take a course on translating our complex technical work to non-technical people and I didn't recognise its importance at the time because I was only interested in chemistry, but as I began my working career I realised how useful it was. You can have the best idea in the world, but if you can't explain it to someone who makes the decisions, it will stay just an idea.

What advice would you pass on to the young scientists starting their careers today?

Early in my career, an opportunity arose for a move to Australia with the Manufacturing Excellence team. While it was a big change in my life, I look back on the experience fondly.

My advice to the younger generation is that you will be given opportunities, so don't be afraid to take them. You only get a certain number of chances in a lifetime, so it's best not to overthink it too much.

Having said that, it's important to stay humble about the opportunities you are given. Always stay humble and curious. Sometimes you're not doing the most exciting tasks, but you need to get your hands dirty to learn and grow to prepare for future opportunities.

When reflecting on your career at Orica, what are the moments that stand out for you?

I've met so many interesting people in my 33 years with Orica, but if I had to choose one who stands out it would be my first manager, Lars-Gunnar Löfgren. Lars's ability to take the time and help me early in my career really meant a lot to me, and we became good friends. He took me under his wing and became my mentor at a time when we first implemented the detonator without primary explosives. Even today, we are the only manufacturer in the world with this technology, so I am particularly proud of having worked on this project. Looking back, it makes me think about how important it is to make time to teach new starters and support them, as it's easy to get lost in our busy schedules.

What skills or competencies have you developed, or improved during your time at Orica?

Understanding the importance of customer service and the value in spending time with customers to understand their point of view.

For a while, I worked in a role where I was going out to sites to review issues with the products, for example, in situations where we were recording misfires. When I arrived at these sites, I expected the customer to be upset that the product wasn't working as smoothly as expected, but instead they were extremely thankful that someone had come out to the site and was really trying to help them.

I don't recall a single customer who wasn't just grateful to have me there helping. And for me, it was invaluable to see how the products I was developing in the lab were being used in the real world, and I could take that experience back with me. So, while I hadn't expected it to be a pleasant experience going into it, I was able to really understand what was and wasn't working in the field, so both sides got a lot out of it in the end.

Appendix 1: Timeline of ICI and Orica

1862 Alfred Nobel begins manufacturing nitroglycerine in a workshop near Stockholm, the world's first modern explosives factory

1867 Nobel invents dynamite

1874 Friedrich Krebs establishes a base at Kororoit (later renamed Deer Park) outside Melbourne to service the goldmining industry

1875 The Australian Lithofracteur Company (Krebs Patent) Ltd is registered and opens for business, according to a notice published in *The Argus*

1888 The Australian Lithofracteur Company changes its name to the Australian Explosives and Chemical Company

1897 The Nobel Dynamite Trust acquires the Deer Park works

1901 Prime Minister Edmund Barton visits Deer Park, declares Australia must make cordite

1907 The High Explosives Trade Association is established to fix prices and allot market quotas

1908 Mining customers sign a contract with De Beers to establish a competitive source of explosives

1918 British Australian Lead Manufacturers created

1919 Electric detonator made at Brownsburg, Canada

1920 Nobel Industries is established in the UK and a consortium created with Bickford Smith and Kynoch Limited. Nobel's Benjamin Todhunter visits Australia and appoints Elder Smith as its agent with Melbourne-based Sir Lennon Raws in charge

1926 In December, a cable arrives declaring Nobel Industries is now part of Imperial Chemical Industries (ICI), a merger between Nobel, Brunner Mond, United Alkali and British Dyestuffs

1927 DuPont offers ICI its Australian ammonia interests, which is accepted

1929 Deer Park superphosphate works is closed

1934 ICI decrees ICIANZ should make whatever is economically feasible even if this impacts the parent's sales

1935 ICI sanctions an alkali plant in Osborne, South Australia. Two years later, ownership is transferred to ICIANZ

1937 Deer Park starts to manufacture nitrocotton

1939 ICIANZ explosives sales total £1.2 million, one third of total sales and 44 per cent of gross profits

1940 ICIANZ commissions a detonator plant and ammonia fertiliser plant at Deer Park and a phosphorus plant beside the Yarraville chemical works. Production of ammonium chloride and hydrochloric acid begins in Mayfield, Newcastle. ICIANZ acquires land near Botany Bay for a chlorine plant

1942 The Botany plant makes its first chemical, carbon bisulphite

1944 ICIANZ expands its DDT plant at Yarraville to combat malaria

1947 ICIANZ obtains majority control of the BALM paint company

1949 ICIANZ builds its first PVC plant at Botany

1956 Prime Minister Sir Robert Menzies opens ICIANZ's new research lab in Ascot Vale, Melbourne

1957 A new BALM paints plant is erected in the Melbourne suburb of Clayton. ICIANZ establishes a global pharmaceuticals division

1958 ICIANZ chair Sir Alexander Fleck opens ICI House (now Orica House)

1961 ICIANZ lists on the Australian Stock Exchange

1964 BALM Paints Limited is registered as a public company

1968 ICIANZ opens the world's first commercial plant making levamisole to control animal parasites

1971 ICI Australia is created

1974 Canadian Industries Limited and Cominco agree to jointly develop an ammonium plant in Carseland, Canada. The Nonel non-electric detonator is first made at Brownsburg, Canada

1975 Plans for a massive petrochemical plant at Redcliff in South Australia are abandoned

1976 ICI Australia installs world's first large-scale plant to use Sirotherm resins

1982 Sir John Harvey-Jones is appointed chair of ICI Plc

1986 Industry Minister Senator John Button slashes tariffs on imported chemicals. ICI Australia acquires Cookson's 30 per cent stake in BALM

1987 Tony Rogers is appointed general manager industrial chemicals

1988 Wesfarmers merges with Dyno explosives. ICI Australia acquires Berger Paints, British Paints and Selleys for $130 million, cementing its leadership in the Australian decorative paint market. The company's decision to take on unions at the Botany site leads to landmark strike action

1989 ICI Australia commissions a chlorine ammonium nitrate and cyanide plant in Yarwun, Queensland

1993 ICI Plc splits, creating Zeneca to house pharmaceutical assets

1994 ICI Australia creates a separate explosives division

1995 Peter Kirby is appointed to ICI Plc to run Dulux globally. Timothy McVeigh uses ICI ammonium nitrate to bomb the Murrah building in Oklahoma City, killing 168 people; ICI stops US sale of its fertilisers

1997 ICI Plc spends US$7.5 billion to buy Unilever's specialty chemical business. ICI Plc sells its 62.4 per cent stake in ICI Australia

1998 On 2 February ICI Australia changes its name to Orica. The technical paint division is sold to PPG. Orica pays $570 million for ICI Plc's global explosives business, giving Orica global leadership with 20 per cent market share and control of North American and Latin American operations

1999 Orica sells its polyurethane assets to Huntsman. The olefins and hydrocarbon business in Botany and Altona are merged with ExxonMobil's Kemcor to create Qenos

2001 Malcolm Broomhead replaces Philip Weickhardt as chief executive. Orica sells its art collection to Kerry Stokes for $13 million

2002 Orica acquires the Fernz trading arm and sells its crop protection business to Nufarm

2003 Pivot Ltd and Incitec merge; Incitec Pivot is listed on the ASX with John Watson chair and Greg Witcombe chief executive

2004 Orica acquires Bronson & Jacobs

2005 Barbara Gibson steps down from running the chemicals division and is replaced by John Beevers (manufacturing) and Bronek Karcz (trading). Orica sells Qenos to China National Chemical. In September Orica pays $900 million for Dyno Nobel, excluding Australia and the US, part of a $2.2 billion consortium purchase with Macquarie Bank from private equity firm Industri Kapital. Julian Segal is appointed chief executive of Incitec Pivot, replacing Greg Witcombe

2006 DuPont sells its US explosives business to Dyno. Orica pays $857 million for mining chemicals concern Minova. In May Orica raises $750 million by selling its 70 per cent stake in Incitec Pivot

2007 ICI Plc is acquired by Akzo Nobel for US$16.2 billion. Orica pays $775 million for mining firm Excel, which is merged with Minova

2008 Incitec Pivot acquires Dyno Nobel Australia and the US for $3.3 billion

2010 Dulux is demerged with a net profit of $70 million and $800 million in value

2012 Orica installs new abatement equipment in the nitric acid plant at Carseland; the technology is later adapted for Kooragang Island, Newcastle

2014 Orica sells its non-mining chemicals business to Blackstone for $750 million; the business is later renamed Ixom

2015 Brownsburg, Canada, becomes a global hub for wireless blasting systems

2017 Orica buys the GroundProbe™ company for $205 million

2020 Orica acquires Exsa, Peru's leading manufacturer and distributer of industrial explosives for ~$302 million

2022 Orica and Epiroc form a partnership with Agnico Eagle Mines to pioneer the first wireless underground charging. Orica sells Minova to Aurelius for $180 million after $1.7 billion in write-downs, and acquires Axis Mining for $260 million

2023 Climate Change Minister Chris Bowen launches the green hydrogen hub at Kooragang Island

2024 Orica acquires Terra Insights, a leading end-to-end sensors, software and data delivery technology platform for geotechnical, structural and geospatial monitoring for CAD$505 million.

Appendix 2: Modern era management

Chief executives

1953–71	Sir Archibald Glenn
1971–80	David Zeidler
1980–84	Milton Bridgland
1984–87	Chris Hampson
1987–92	Dr Michael Deeley
1992–97	Warren Haynes
1997–2001	Philip Weickhardt
2001–05	Malcolm Broomhead AO
2005–11	Graeme Liebelt
2012–15	Ian Smith
2015–21	Alberto Calderon
2021–	Sanjeev Gandhi

Chairs

1963–73	Sir Archibald Glenn
1973–80	David Zeidler
1981–92	Milton Bridgland
1992–93	Bruce Vaughan
1993–95	Colin Short
1995–2001	Ben Lochtenberg
2001–09	Don Mercer
2009–14	Peter Duncan
2014–16	Russell Caplan
2016–	Malcolm Broomhead AO

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Of course, any errors are my own.

Picture credits

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Orica's Precision Ammonia™ fertiliser delivery to a cotton farm in New South Wales, Australia.