YALLOURN

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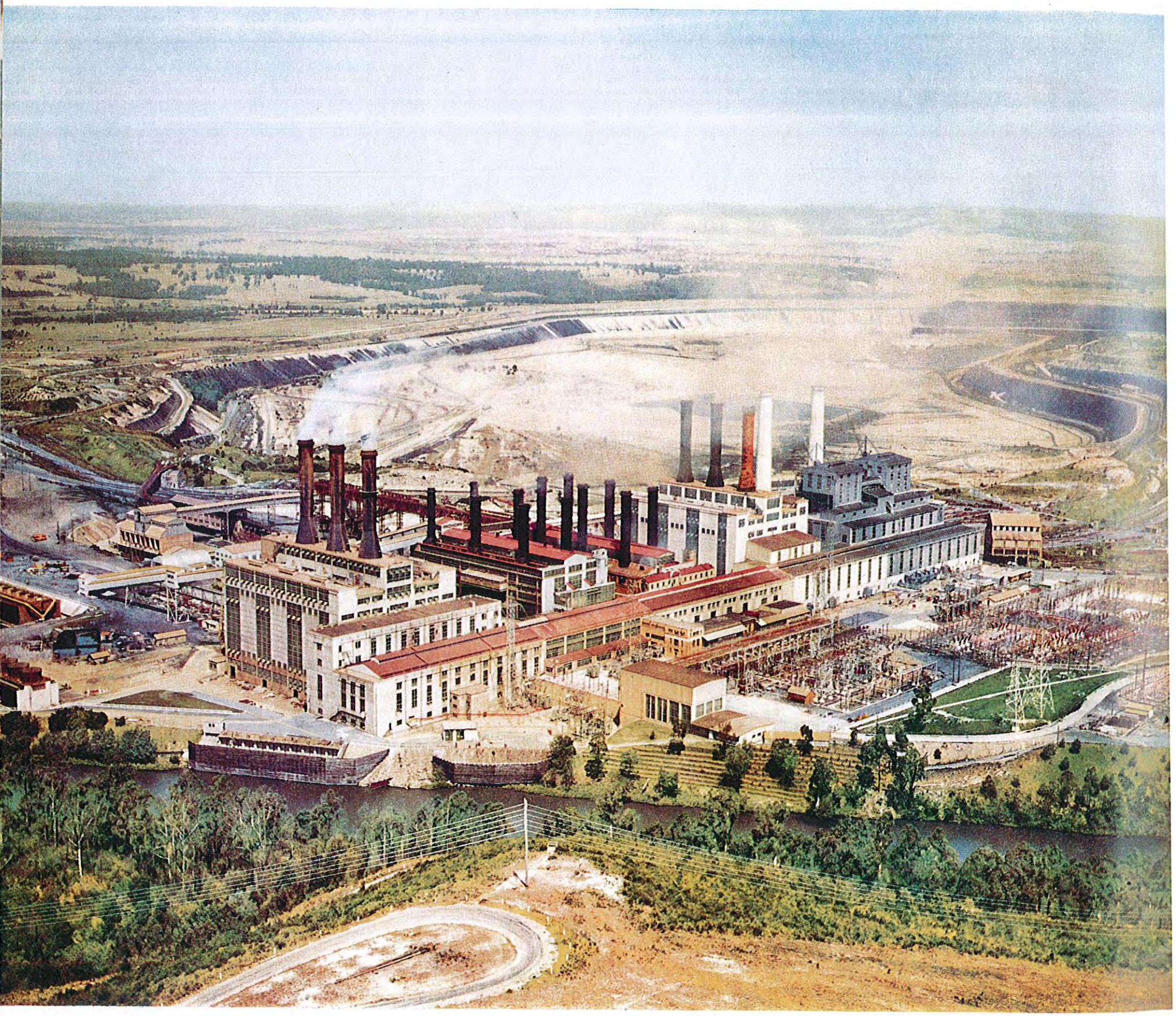
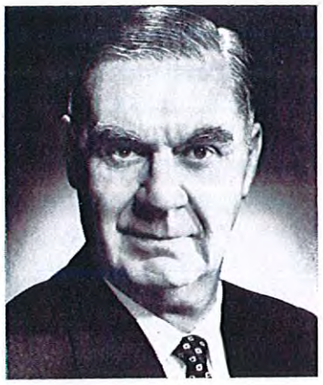
VICTORIA • AUSTRALIA

STATE ELECTRICITY COMMISSION OF VICTORIA



Yallourn Power Station and the Open Cut



Australia's progress since the Second World War has been remarkable — and nowhere more so than in Victoria. Although the smallest of the mainland States, Victoria is today the most highly industrialised, the second most populous and the most rapidly developing State in the Commonwealth. Many factors have contributed to this growth, but the one of greatest importance is the vast wealth of easily extractable brown coal in the Latrobe Valley which is the source of most of Victoria's electricity and a major part of its solid fuel.

It is axiomatic in the present age that a plentiful supply of electric power constitutes the foundation of a nation's prosperity, and upon that foundation rests also the well-being of its people. In the practical realisation of this brown coal wealth, bequeathed to us from prehistoric times, Yallourn, with its open cut, its power station and its briquetting works, was the beginning — and is still the heart — of the great power and fuel developments of the State Electricity Commission of Victoria on which the daily life of the whole State depends.

We of the 1960's are reaping the benefit of the foresight, the enterprise and the courage of those who understood the potential value of our brown coal resources and successfully put them to use. Writing in 1921 — within a few months of his appointment as Chairman of this Commission and fresh from his triumphs as one of the great generals of the First World War — Sir John Monash described the then embryonic brown coal enterprise at Yallourn as a project "whose possibilities are quite without limitation, and whose benefits to the community of this State no man can over-estimate." It would become, he said, "a monument to every man, however humble, who has shared in its creation."

Today, in the gardens of Monash Square at Yallourn, the statue of Sir John looks out upon the town and undertaking he did so much to create — a monument indeed both to himself and to all the engineers, administrators, technicians and workers of every trade and calling who have brought this great enterprise to the state where it now ranks as one of Australia's greatest industrial developments. To them this book is dedicated.

W. H. Connolly

CHAIRMAN

HISTORICAL

Victoria has an asset unique in Australia and uncommon anywhere — enormous deposits of brown coal, which are chiefly located in the Latrobe Valley, 90 miles east of Melbourne.

Developed around the two great power and fuel undertakings of the State Electricity Commission of Victoria at Yallourn and Morwell, the Latrobe Valley region contains the largest single deposit of brown coal in the world. From Yallourn eastwards thick coal seams are almost continuous for 40 miles, and for much of the distance are between five and ten miles wide.

The deposits comprise thousands of millions of tons of brown coal in immense seams which over large areas are covered by only a shallow overburden; and due to this highly favourable ratio of coal to overburden, they are exceptionally well suited for open cut development. Proved reserves of brown coal in the Latrobe Valley which could be economically won in large-scale workings by present open cut methods are estimated at about 17,500 million tons. Mechanisation enables brown coal to be won continuously in great quantities and at low cost. Due to these favourable factors, generating costs in the Latrobe Valley power stations are among the lowest in Australia.

In its raw state the brown coal of the Latrobe Valley is a soft, crumbly fuel with an earthy texture and a high moisture content. By the application of special combustion technique, this coal can be burned in its raw, moist state for steam raising in electricity generating stations located on the coal fields, and in specialised industrial plants. It can be compressed into high quality fuel briquettes for electricity generation in power stations located at centres distant from the coal fields; for industrial and domestic use; and for the production of gas for town supplies.

Upon the brown coal fields in the Latrobe Valley the State Electricity Commission has established the large steam power stations carrying the base load in the Commission's State-wide electricity system. Burning brown coal delivered direct from the coal fields, these power stations today generate about 66 per cent of Victoria's electricity, and the Commission aims to increase the proportion to 90 per cent by the early 1970's.

Of these stations Yallourn, on the western edge of the Latrobe Valley coal belt, is at present the largest, as it is also the largest power station in Australia. Yallourn Power Station and the nearby Morwell Power Station are at present the only ones in the Southern Hemisphere operating on brown coal. A third station at Hazelwood, near Morwell, is due to start in 1964.

In its long journey in geological time from the deposits in the swamps of prehistoric Victoria, brown coal has been formed from the accumulation and partial decomposition of many types of vegetation including countless millions of pollen grains (principally beech), tree trunks (mainly pine), leaves, spores, seed pods and resin. Sometimes fossilised tree trunks are found.

Some of this debris of a bygone era can be recognised today as reeds, ferns and trees similar to existing vegetation but, except

for a few shrubs and trees which are still common, vegetation differed greatly from that now found in the Valley. The seams in the brown coal deposits are considered to range between late Eocene and early Miocene in age and are thus between 50 and 20 million years old. The formation of one foot of brown coal, it is estimated, may have taken from 700 to 1,500 years; so that continuous coal, proved by exploratory boring to be several hundreds of feet thick in certain areas, may have taken more than half a million years to accumulate.

The face of the Yallourn brown coal seam is seen to have horizontal bands, indicating minor variations in the conditions under which different layers were formed. Most of the bands are of two main types — lignitic coal and earthy coal — suggesting alternating conditions of depth of water in the swamp. Throughout the coal seams, some thin irregular bands of "leaf coal", "fern coal" and "pollen coal" are found.

As plant debris increased in thickness, the floors of the swamps slowly subsided at approximately the same rate. But, as in most similar basins, there were breaks in continuity in this gradual accumulation of plant debris. A too rapid subsidence of the swamp floors caused these areas to be flooded, plant growth and peat formation to cease, and sands and clay to be deposited.

As these deposits gradually built up the floor level and the depth of water decreased, the swampy vegetation once again spread over the area, and the accumulation of plant debris began again. In this way were formed the several seams of brown coal, separated by bands of clay and sand, discovered during exploratory boring of the Latrobe Valley deposits.

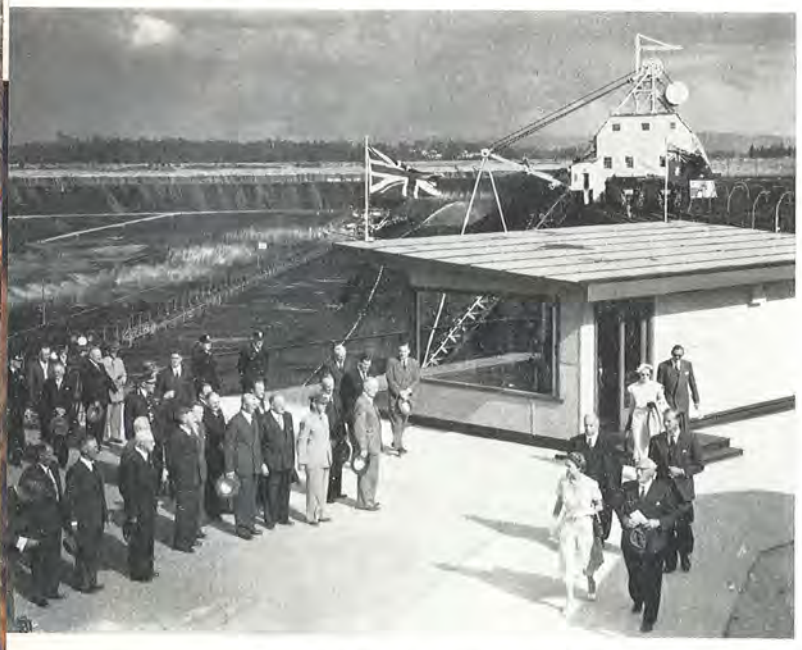
In the vast geological processes at the end of the long period of deposition earth movements occurred, as a result of which the coal seams became folded. A period of erosion followed when some of the coal was worn away. Subsequently this eroded plain was covered by a layer of clays, sands and gravels which buried the outcrops of brown coal. Vegetation sprang up and forests grew on this covering of soil above the young coal deposits.

Turning the first sod on the site of the Yallourn Power Station, February, 1921. Left to right:—Mr. C. H. Kernot (later Chief Engineer, S.E.C.), Mr. A. H. Merrin (later Secretary for Mines), Sir Thomas Lyle (Chairman of the Electricity Commissioners until 1920 and later S.E.C. Commissioner), Mr. R. Liddelow (Secretary and later Manager, S.E.C.), the Hon. G. Swinburne (S.E.C. Commissioner), Sir John Monash (S.E.C. Chairman, 1921–31), Sir Robert Gibson (S.E.C. Commissioner)

Left: Early work on the site of the Yallourn Open Cut, 1921

Right: Maiden Street, the first street in Yallourn, 1921

Temporary power station, Yallourn (closed down in 1924)



Her Majesty, Queen Elizabeth, and H.R.H. the Duke of Edinburgh at the Yallourn Open Cut, March, 1954

To the pioneers of Victoria therefore the brown coal seams lay hidden. They saw wooded lands, to be cleared as pastures for sheep and cattle, and they set out to create a prosperous farming community in the fertile valley to which the Latrobe River gave its name. Over the brown coal lay the overburden and, as the years passed, sleek dairy herds grazed and comely settlements arose. All this was dairying country and it was as such that early settlers making their way eastward from Melbourne through the province of Gippsland thought of it.

But not all of them. The 19th Century was an age of great scientific curiosity and technological progress; in addition, in Victoria, there was a strong mining tradition, derived from the goldfields, and there was also an economic compulsion to find usable coal. The colony (as it then was) was largely dependent for supplies of black coal for its gas and fuel on places beyond its own borders. The fact that the brown coal deposits remained for so long largely undisturbed was due to no lack of vision — for there was that in plenty — but, as in so many other cases, to the fact that vision outran technology.

Brown coal was first found in Victoria at Lal Lal near Ballarat in 1857. Subsequent investigations have shown that the economic deposits in Victoria are confined to the south of the State. Outside the Latrobe Valley the chief areas are Welshpool-Alberton, Altona-Bacchus Marsh, Dean's Marsh, Anglesea, Wensleydale and Lal Lal. A number of seams are 100 feet thick and some over 300 feet thick. In the Latrobe Valley several superimposed seams totalling 880 feet in thickness with only narrow breaks between them have been proved over a wide area.

The first attempt to exploit the Latrobe Valley deposits was made in 1889 when the Great Morwell Coal Mining Company established an open cut north of the Latrobe River (now Yallourn North). Coal was sold for domestic use and for steam raising and, foreshadowing a development of more than 60 years later, the suggestion was put forward for manufacturing town gas on the site and piping it to Melbourne.

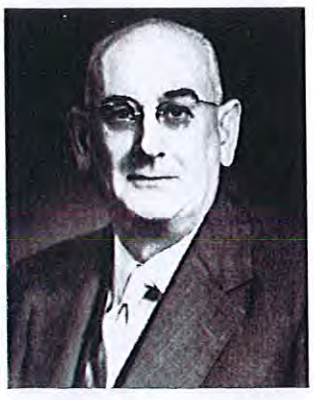
With official encouragement attempts were made to manufacture briquettes and the Great Morwell Coal Mining Company set up a factory but it was unable to compete with imported black coal and, in 1899, it ceased operation. Its difficulties were many — competition of black coal, a disastrous bush fire and the nature of the brown coal itself.

Brown coal has a very high moisture content, ranging from about 50 per cent in the comparatively small Yallourn North deposits to between 65 and 67 per cent in the main Yallourn field, where every ton of coal when it is first dug contains two-thirds of a ton of water. The successful exploitation of the brown coal had to wait not only upon more pressing national needs but upon technological advances, notably the development in Germany of specialised plant from which has evolved the giant earth-moving and coal-winning equipment of today.

Memorial at Yallourn to Sir John Monash
(S.E.C. Chairman from 1921 until his death in 1931)

YALLOURN GENERAL SUPERINTENDENTS

J. M. Bridge, 1923–1925, 1927–1934



C. H. Kernot, 1925–1927, (Acting)

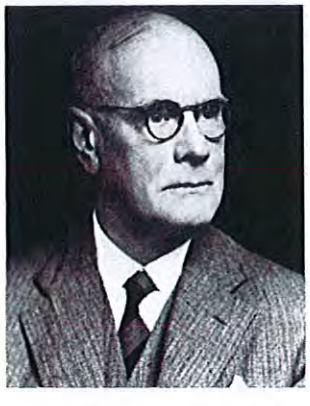
With continuing interest in Victoria in the possibilities of the brown coal fields went keen observation of the progress of the brown coal industry in Europe and particularly in Germany and Austria. When, with the First World War, the electricity supply position in Victoria became acute, and the dependence of the State on outside sources of black coal became more than ever evident, it was realised the time had come to act.

The Institute of Victorian Industries in 1916 submitted a report to the Victorian Government recommending utilisation of brown coal for electricity generation and briquette production. In 1917 the Victorian Government appointed the historic Brown Coal Advisory Committee whose recommendation to establish a power station on the coal fields near Morwell, with transmission to Melbourne, was the starting point of Victoria's State electricity system as it exists today. In 1918 the Parliament of Victoria enacted legislation which committed the State to the development of Victoria's own power resources.

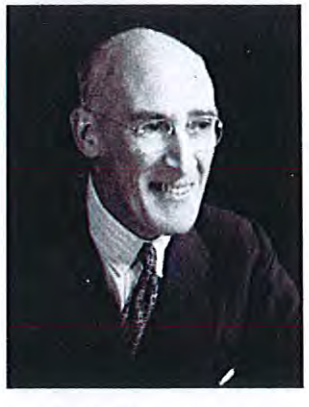
The establishment, by this Act, of the State Electricity Commission (known in its earliest years as the Electricity Commissioners) was the turning point not only in Victoria's electrical development but in the development of the State's resources of brown coal for both power and fuel.

The first duty of the Commissioners was to submit a "scheme for coal mining and electrical undertaking . . . in the neighbourhood of Morwell and the distribution of electricity therefrom . . .". With the genius and drive of Sir John Monash, Chairman of the Commission from 1921 until his death in 1931, and with the loyal and enthusiastic help of all those who believed in the project, the mission was accomplished.

The site chosen in the neighbourhood of Morwell was Yallourn, on the Latrobe River, so named from two aboriginal words, *yalleen* (brown) and *lourn* (fuel). The story of the coal winning operations, the establishment of the power house and the briquetting factory and the development of the town of Yallourn itself is an important part of Victoria's history. From this effort has grown the largest electricity supply authority in Australia.

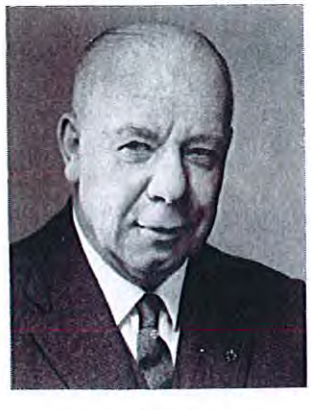


R. D. Dixon, 1934–1938



R. A. Hunt, 1938–1949
(S.E.C. Chairman 1949–1956)

W. Morrison, 1949–1951



John Field, 1951 to date

Coal production in the Yallourn open cut is now over 12 million tons a year. The entire output is used either for fuel in Yallourn Power Station, or for manufacture into briquettes. To win this coal the Commission uses dredgers of two types — bucket-wheel and bucket-chain. All are electrically operated.

As with overburden removal, bucket-wheel dredgers dig coal by means of buckets mounted on a huge wheel. In bucket-chain dredgers an endless moving chain of buckets digs the coal from the coal face. Three of the earlier and smaller machines, all of the bucket-chain type, move along rail tracks as they dig the coal. They include the two original coal dredgers and a third machine with a capacity of 800 tons an hour, which was installed in 1950.

The most recently installed dredger is of bucket-chain design and moves on two pairs of special type crawler tracks. This enormous machine, 90 feet high and weighing about 2,200 tons, is one of the most complex pieces of machinery ever assembled in Australia. Dominating the skyline of the open cut, it is one of the marvels of Yallourn. In marked contrast to the equipment of the old steam shovel days, it can dig 1,750 tons of coal an hour and can "reach out" to dig nearly 80 feet above and 87 feet below its track level. A bucket-wheel coal dredger (identical with the overburden dredger) has an output of 1,350 tons an hour. It can dig to a height of 70 feet above its track level.

Electric trains are used for the transport of coal from the dredgers to the ditch bunkers serving the power station and the briquette works. A train comprises a rake of 12 trucks with gable bottoms and hinged sides for quick unloading and each carrying, according to size, 20 tons, 26 tons or 33 tons of coal. The rake of trucks is hauled by either a 60-ton, 1,000 h.p. electric locomotive or twin 46-ton, 440 h.p. electric locomotives.

For supply to the power station the trains deliver the coal to two roofed ditch bunkers, each of 7,000 tons capacity. These bunkers are located within the open cut at upper and lower levels so as to be readily accessible to trains from the different coal faces at which the dredgers are working.

From the bunkers the coal is delivered to the power station by conveyor belts. The belts cannot be loaded directly from the trains and, as it is necessary to have some coal storage in the system, the coal is first discharged into the ditch bunkers and then loaded again on to the belts by ditch bunker loaders.

There are at present three lines of belts, each capable of transporting 1,500 tons of coal per hour. These belts deliver the coal to additional bunkers located adjacent to the power station. From these bunkers the coal is delivered to crushers which prepare it for use in the boiler furnaces, and from the crushers further lines of conveyors deliver the coal to hoppers at the top of the boiler houses above the furnaces. Coal for the Yallourn Briquette Works is delivered by the trains at two different levels to bunkers serving a separate conveyor system, with a capacity of about 450 tons per hour.

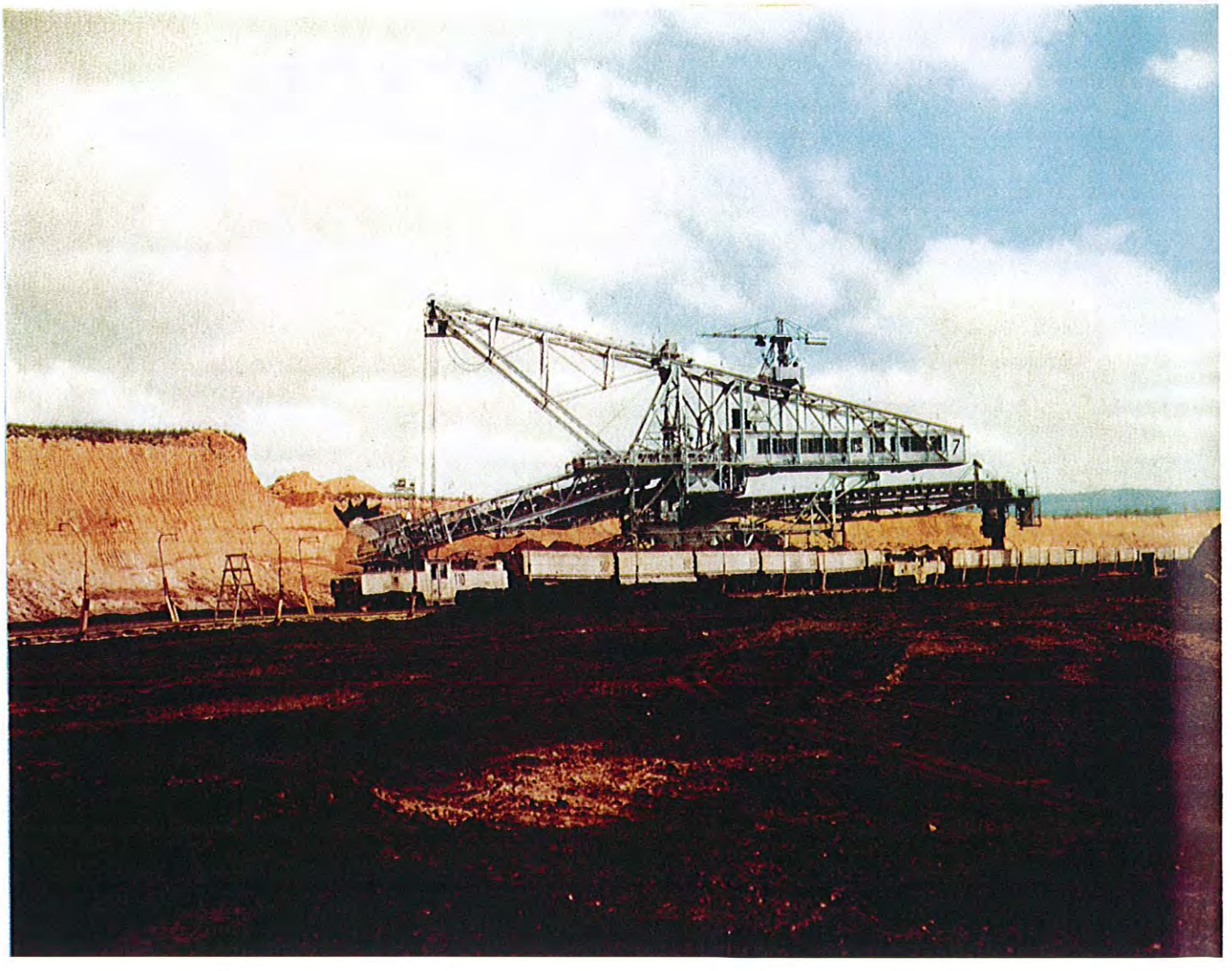
Bucket-chain coal dredger, Yallourn Open Cut

As the dredgers dig into the overburden and the various coal faces, the rail tracks for the trains serving them must be re-aligned and it is necessary also to re-align the rail tracks on which the older dredgers run. Re-alignment is done mechanically by a track-shifter which picks up the rails and lifts them to a new alignment in one traversing movement as it proceeds along the track.

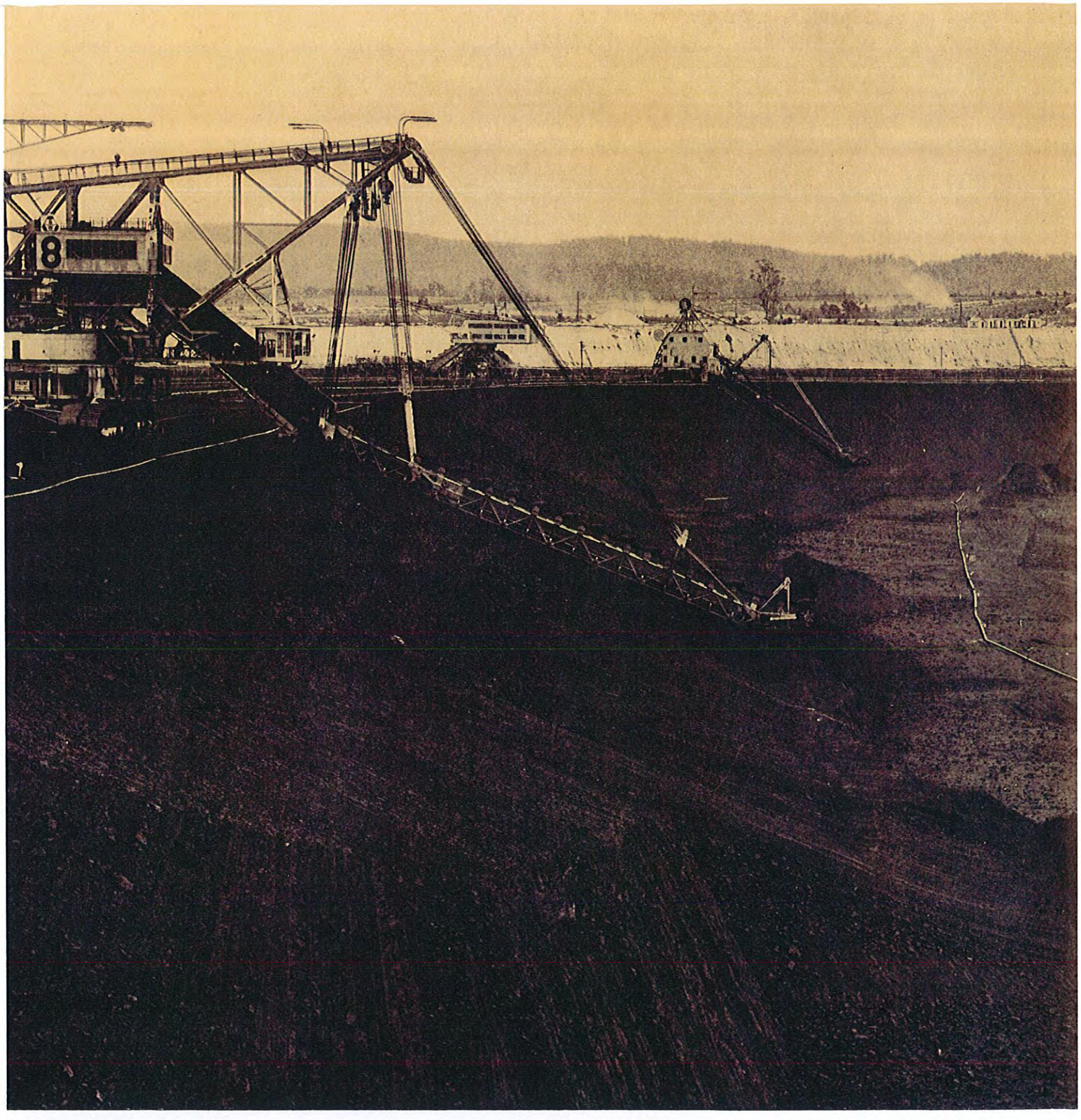
Although the freshly dug coal is moist and fire-resistant, a layer of highly inflammable dust is formed when the surface dries out. Within the open cut stringent precautions are taken to minimise fire risks, and a system of sprays is installed. During dry, windy days the sprays are brought into service and considerable areas on all levels, except the working faces, are damped down. If a fire does break out in a particular spot, the sprays covering that area can be turned on to isolate the fire.

The Commission carries out extensive fire protection work over a large area of forest country surrounding Yallourn. It has built 130 miles of access tracks for fire fighting, and has established 200 storage pondages to provide readily accessible emergency water supplies. During the summer danger season trained fire fighters with a fleet of water tankers and other modern equipment are on call, and fire watch towers are regularly manned. As a further precaution, scrub country adjacent to the power station and the open cut has been converted to open pasture land.

Loading a coal train in the open cut



Bucket-wheel dredger removing overburden from the coal. Belt conveyors have now superseded trains for overburden transport



Yallourn Open Cut—a general view

THE POWER STATION

Yallourn Power Station is one of the largest brown coal burning stations in the world. Producing more than half Victoria's electricity, it is the chief unit in the Commission's system of interconnected thermal and hydro-electric power stations.

Yallourn has five separate sections "A", "B", "C", "D", and "E", representing the stages of its development from the date, 1924, when "A" station first began operating. In it may be seen the transition from what now seem comparatively small beginnings (although they did not seem so then) to plant of steadily increasing capacity, efficiency and operating economy.

At Yallourn, engineers will find special interest in the technological progress which is reflected in these various stages — problems in the efficient use of brown coal tackled and overcome, revolutionary development in boiler-house design and practice and changing concepts of design of generating equipment.

The first turbo-generators installed at Yallourn were of 12½ megawatts capacity. Six of these were in operation by 1928, completing the "A" station. The plant has given outstanding service for many years, and the two oldest machines have now each run for approximately 250,000 hours.

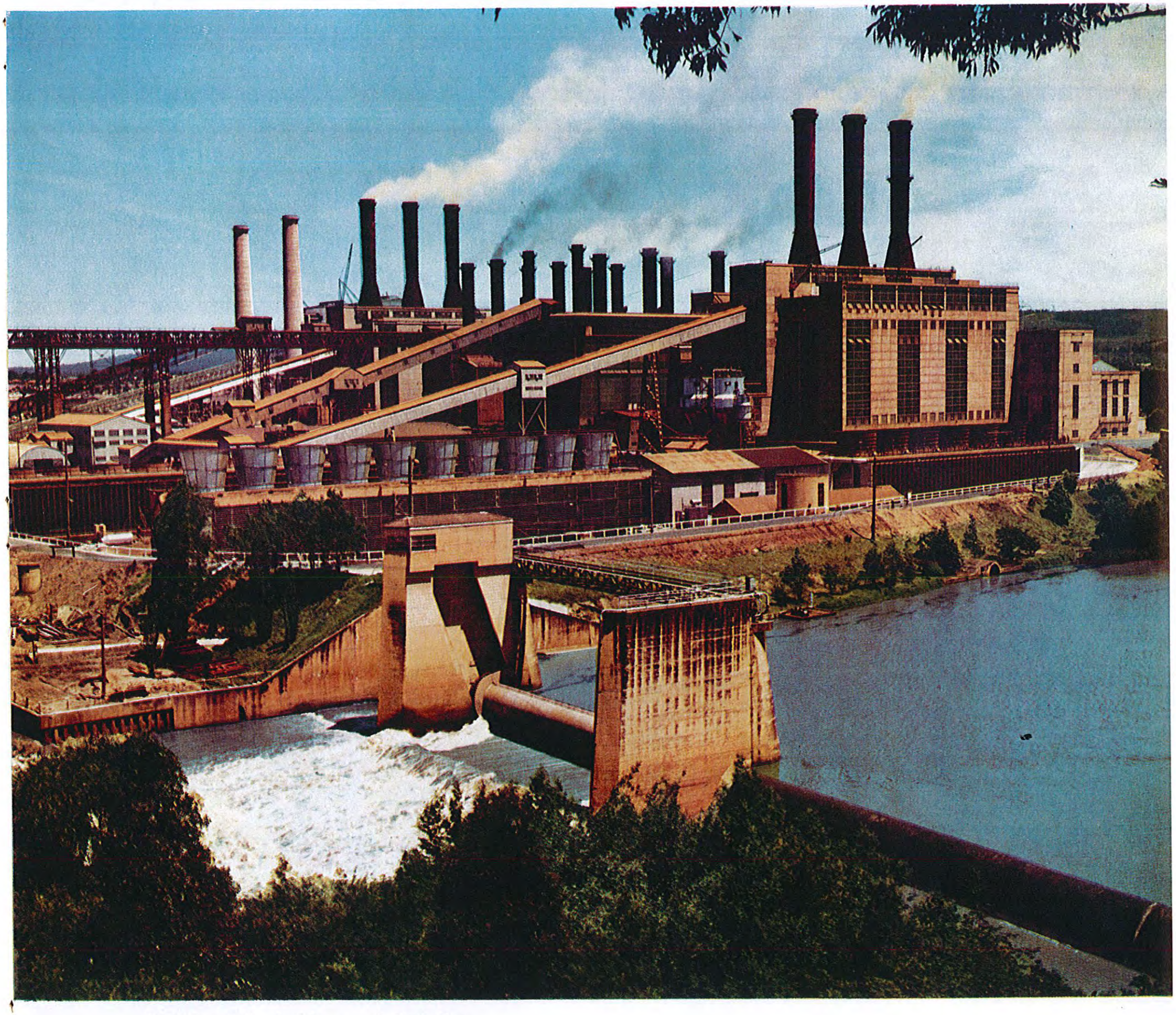
The boiler plant in "A" station consists of 12 boilers each having a capacity of approximately 70,000 pounds of steam per hour at a pressure of 270 pounds per square inch and a temperature of 650 degrees Fahrenheit. The high moisture content of the raw coal as delivered from the open cut necessitated the incorporation in the boiler system of drying shafts in which hot gases are utilised to reduce this moisture content as the coal passes from the overhead bunkers to the furnaces.

"B" station suffered the delays of the depression period of the 1930's and the three 25-megawatt machines originally planned were not all in service until 1938. In the meantime it had been found that the 10 boilers for "B" station, each rated at 75,000 pounds of steam per hour, were, in fact, sufficient for a fourth 25-megawatt machine and this also came into operation in 1938.

Steam pressure was again 270 pounds per square inch but the temperature was increased to 750 degrees Fahrenheit. The design of these boilers took advantage of the experience gained with the "A" boilers and air pre-heaters and mechanical step grates were used to improve combustion.

By the end of the Second World War in 1945 the Commission had thus developed the power resources of Yallourn to 175 megawatts installed capacity, and had accumulated considerable experience in the combustion of raw brown coal. Rapid development of Victoria in the post-war period necessitated further progressive enlargement of the power station to meet continuous growth in the State's electricity requirements.

By 1956 "C" station had been completed with two 50-megawatt sets and one 6-megawatt set, which was installed to permit the transfer of surplus high pressure steam from "C" station to supplement steam production in "A" and "B" stations operating



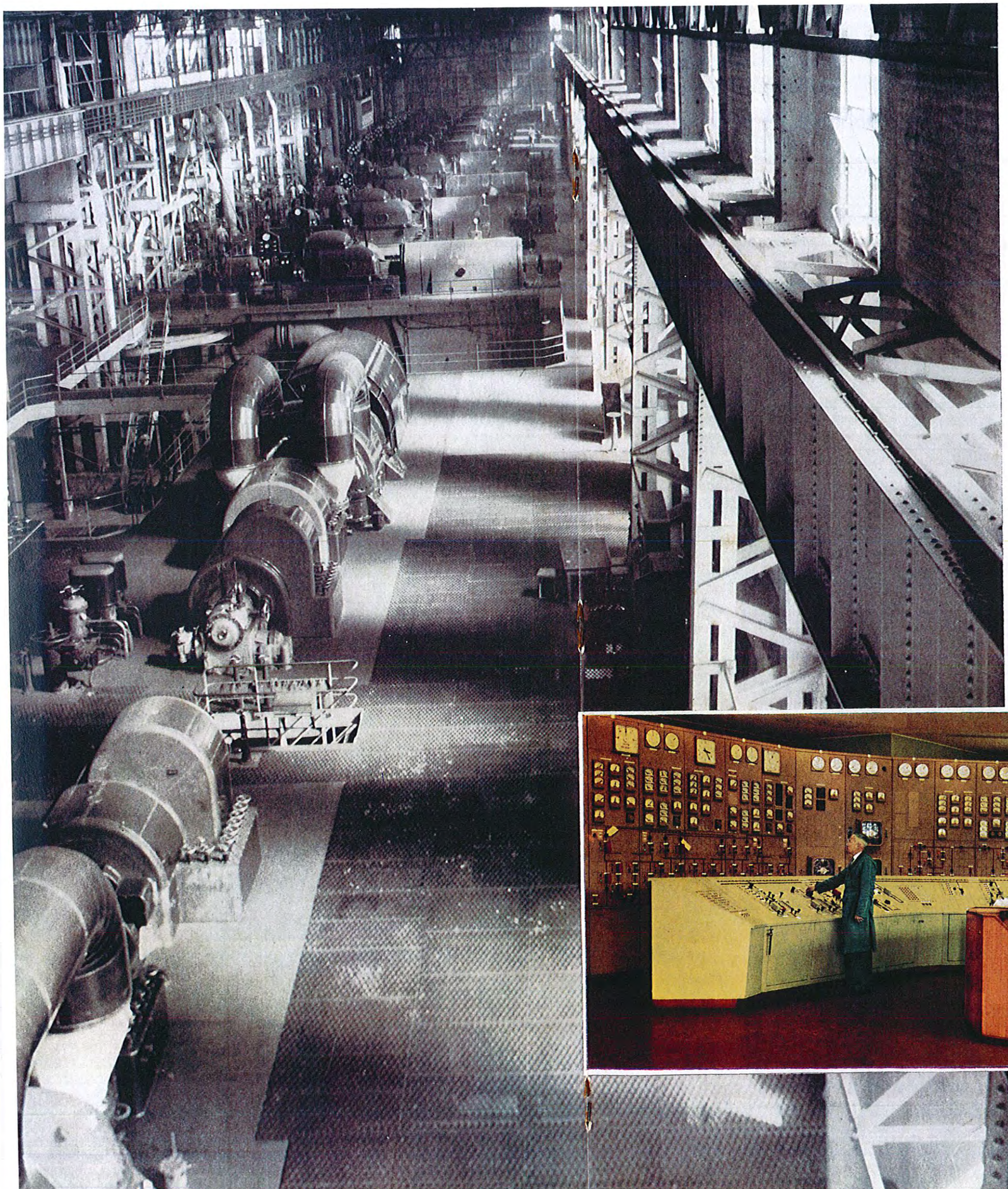
Yallourn Power Station, viewed from across the Latrobe River

at a lower steam pressure. Yallourn was further enlarged in 1958 by the addition of "D" station with two more 50 megawatt sets like those in "C" station, bringing the total installed capacity of the power station to 381 megawatts.

The six boilers in both the "C" and "D" stations are each of 200,000 pounds of steam per hour capacity at a pressure of 645 pounds per square inch and a temperature of 840 degrees Fahrenheit. They incorporate several major improvements in furnace design and the use of mill-firing instead of chain and step grates as in "A" and "B" stations respectively.

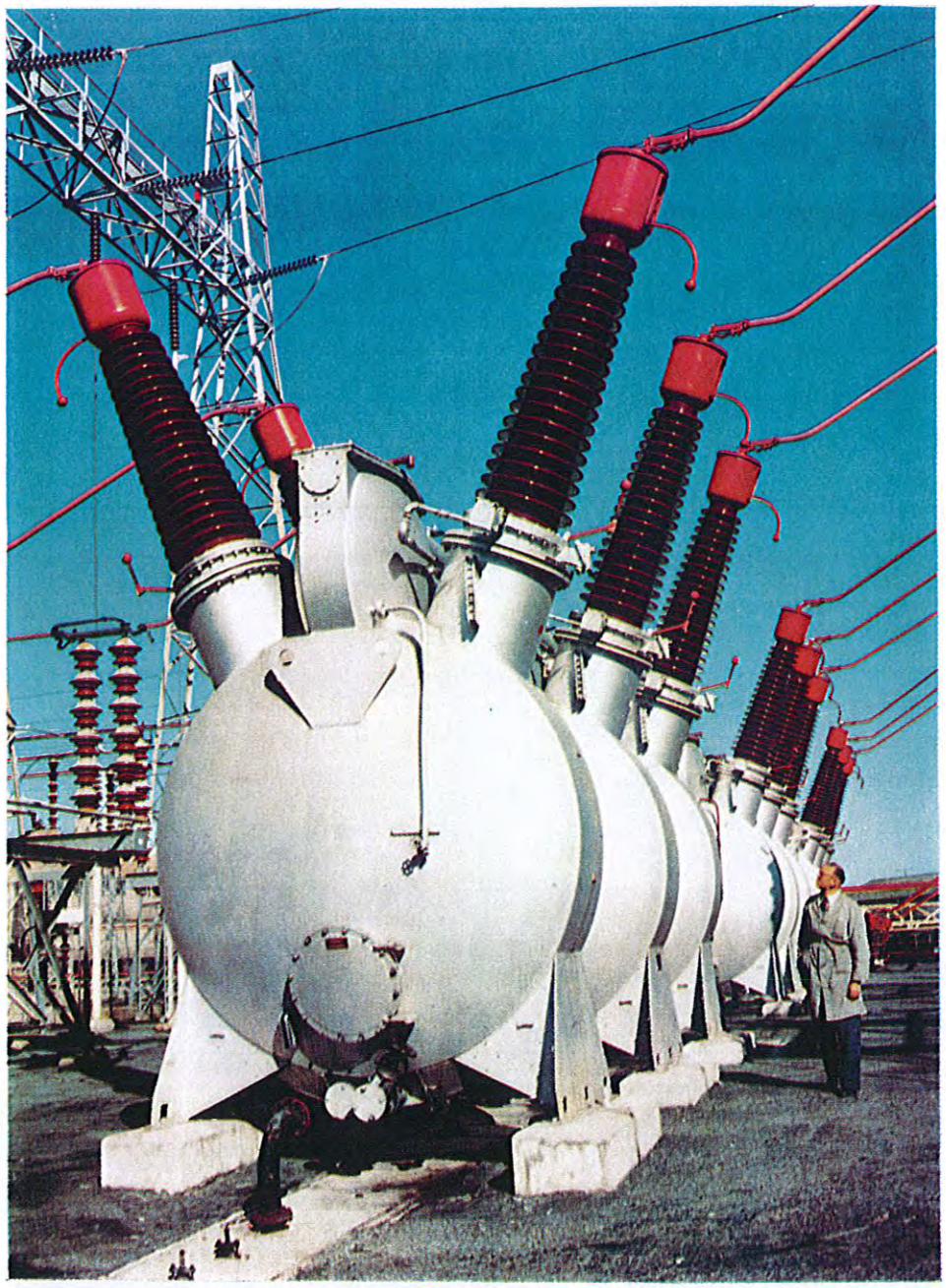
The mill-firing process was developed in Germany. The wet brown coal, previously crushed to not greater than two inches in diameter, is fed into the mill, which consists of a rotor with a number of revolving blades, and is mixed with hot gases drawn from the boiler furnace. Thus the drying and pulverising of the coal proceed simultaneously. The dried, pulverised fuel is then discharged from the mills to burners. There are four mills and four burners to each boiler — with the burners placed at the corners of the furnace. Each of the mills has a capacity of about 15 tons of wet brown coal per hour.

Overall thermal efficiency of the "C" and "D" stations is approximately 22 per cent, based on the net calorific value of the fuel, and is considerably higher than for "A" and "B" stations. This result is due to the combined effect of higher steam pressure and temperature, generating sets of much greater capacity and extensive improvements in boiler design.

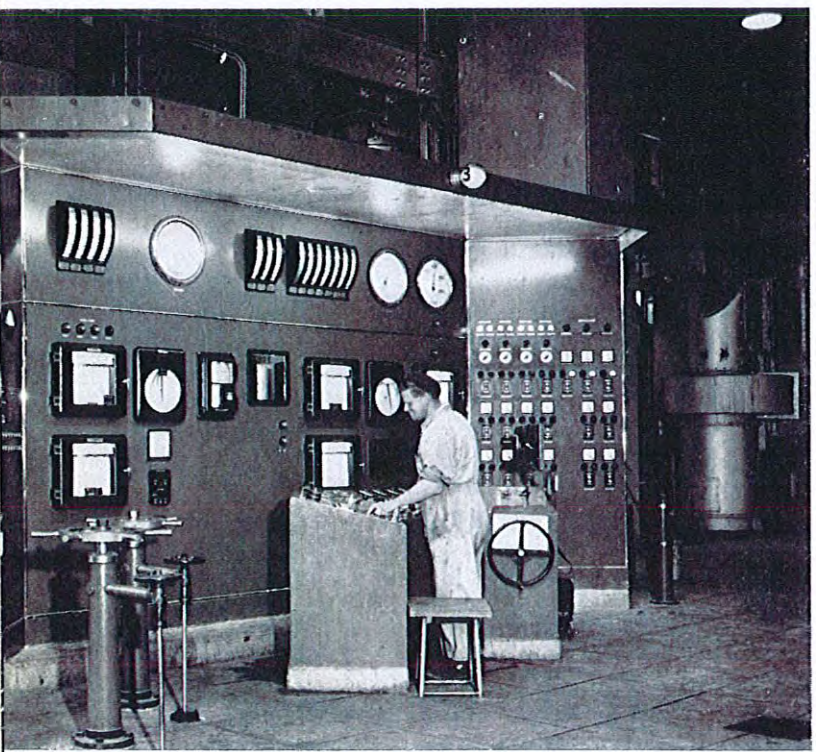


Turbine Room, Yallourn Power Station, and (inset) one of the power station control rooms

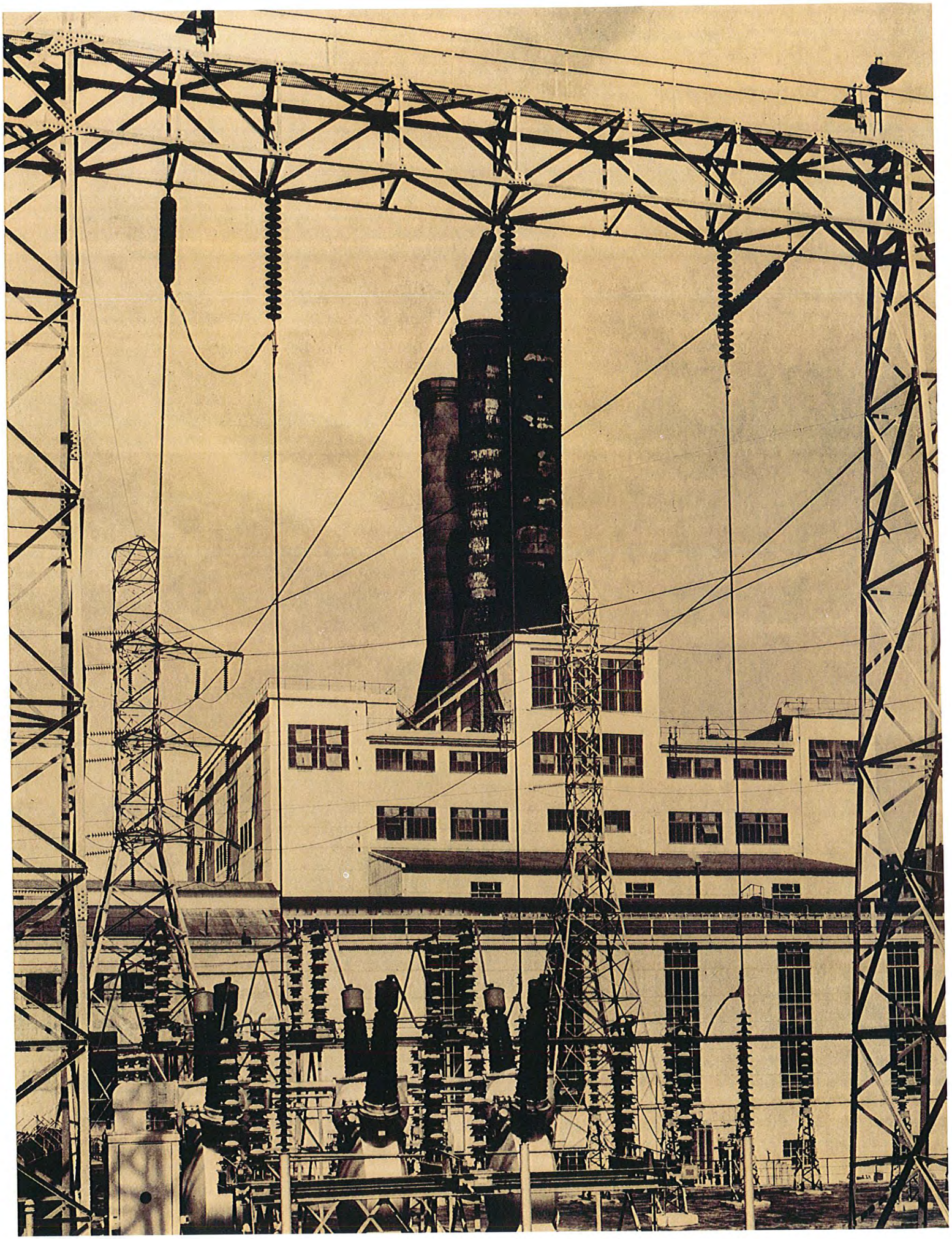
Right: 220,000 volt circuit breakers in the power station switchyard



Below: Control panel for one of the power station's modern boilers



Right: In the power station switchyard



Yallourn's latest and largest extension, "E" station, consists of two 120-megawatt sets and two boilers, each of 950,000 pounds of steam per hour capacity at a pressure of 1600 pounds per square inch and a temperature of 1,060 degrees Fahrenheit using mill-firing. This plant shows a further increase in thermal efficiency to about 28 per cent and brings the installed capacity of the station to 621 megawatts.

Each of the two generators of "E" station has nearly 10 times the capacity of one of the generators of "A" station. There is only one boiler for each of the "E" station generators, compared with two or three per turbo-generator in older parts of the station and as in "C" and "D" station the boilers in "E" are mill-fired. Each "E" station boiler is 180 feet high or as high as a 15-storey building with a chimney nearly 300 feet high beside it. Each is designed to burn 215 tons of brown coal an hour.

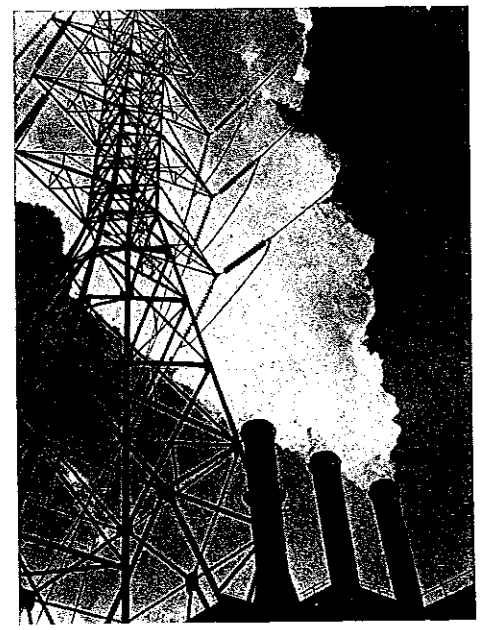
Anyone who completes a tour of Yallourn Power Station from "A" to "E" will find the story of nearly 40 years' development in power generation set out before him. The Yallourn "E" plant is in the forefront of world practice both in regard to general power station operation and also particularly in respect to the combustion of raw brown coal.

Construction of "E" station marked the beginning of a new era in electricity generation in Victoria. Yallourn "E" implements a policy under which for many years to come all major additions to the Commission's generating system will consist of unit plants of the maximum practicable capacity located on the brown coal fields of the Latrobe Valley. This policy is being carried forward in the new Hazelwood Power Station, south of Morwell, where the generating units will each be of 200,000 kilowatts capacity.

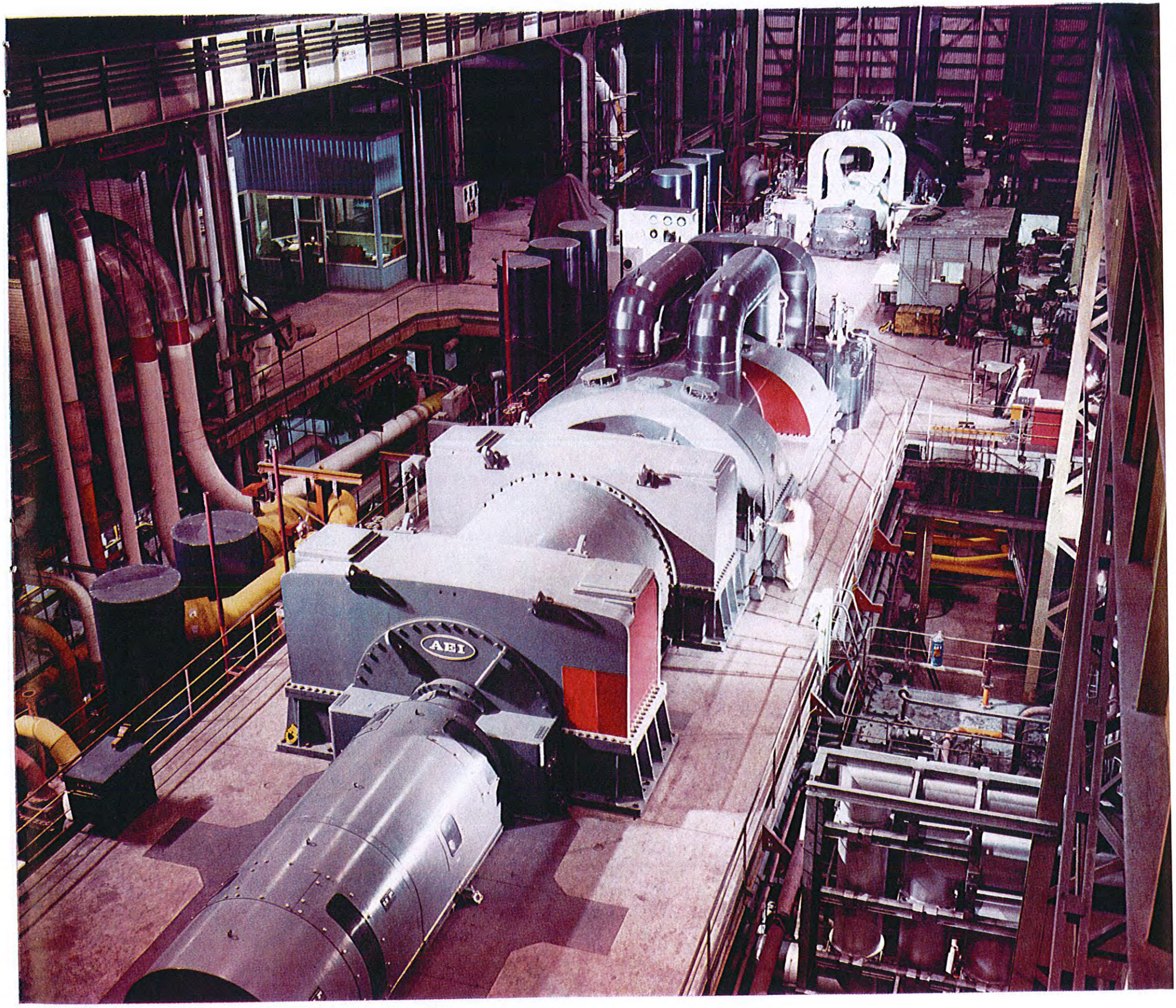
Cooling water for the power station condensers is obtained from the Latrobe River. Yallourn now requires over 20 million gallons of water an hour for cooling purposes. Natural river flow is supplemented by cooling towers with a capacity of nearly 12 million gallons per hour and a 7,500 acre-feet storage upstream from the power station. Beside the power station is a pondage formed by a weir with a roller gate to control the water level.

Power is generated at 11,000 volts and 13,800 volts. This voltage is then transformed to 132,000 volts and 220,000 volts for transmission 90 miles to Melbourne, and, via the large terminal stations in the metropolitan area, into the 220,000 volt system which now forms the backbone of Victoria's State-wide supply network. This network covers most of Victoria and serves over 95 per cent of the population. Extensions into the remaining regions outside the system — most of them sparsely populated — are progressing continuously.

Consumers served already total well over 900,000 and are expected to exceed one million in 1964. The Commission directly supplies consumers in all areas on the network except about 200,000 residing in eleven Melbourne municipalities which are supplied in bulk for local retail distribution.



Yallourn "E" 120-megawatt turbo-generators (during the installation of the second machine prior to commissioning in 1962)


AEI

THE BRIQUETTE WORKS

Because of its high moisture content, to transport brown coal in its natural state would involve transporting two tons of water for every ton of combustible coal — which is not economic for any users at a distance, even if they installed special equipment for burning the raw coal. The logical course is to get rid of the water where the coal is won and to ship the product in a compact form which can be readily handled and stored and easily burned. The most convenient form is the briquette.

As long ago as 1891 the Victorian Government sent a scientist to Germany to inquire into the briquetting of raw brown coal. In 1894 the Great Morwell Coal Mining Company, previously mentioned, set up a briquetting plant on the German model at what is now Yallourn North. Despite many difficulties it appears that good briquettes were made; but it was not possible to compete with black coal at the then prices. A little over a quarter of a century later the situation was to change.

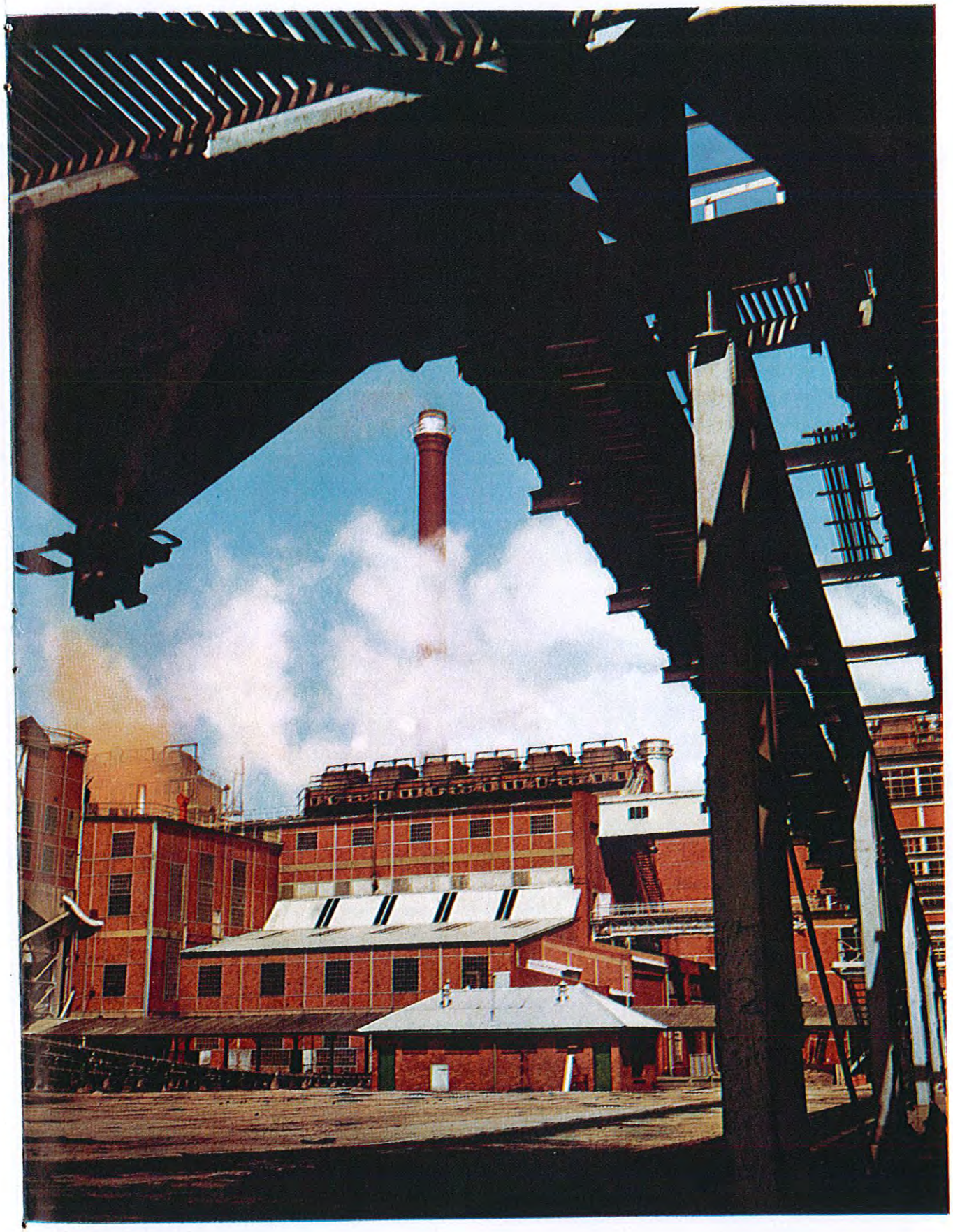
Briquetting in Germany had been carried on from about 1870. Considerable experience had been accumulated and a high degree of technical efficiency had been attained. In Germany brown coal briquettes could compete profitably with black coal despite what were, from the Victorian standpoint, disadvantageous conditions. For instance, ratios of 100 feet of overburden to 40 feet of coal are common in Germany, as contrasted with 40 feet of overburden to 200 feet of coal at Yallourn.

Tests both in Victoria and in Germany gave every encouragement to the establishment of a briquetting works at Yallourn. An experimental plant was established by the Commission and began commercial production in 1925, producing about 300 tons of briquettes a day. It was shown that a high grade briquette fuel for domestic and industrial use could be produced readily without the addition of a binding agent if the coal was dried to a moisture content of about 15 per cent and compressed under a pressure of approximately six to eight tons per square inch. The resulting fuel had a gross calorific value of about 9,600 British thermal units per pound.

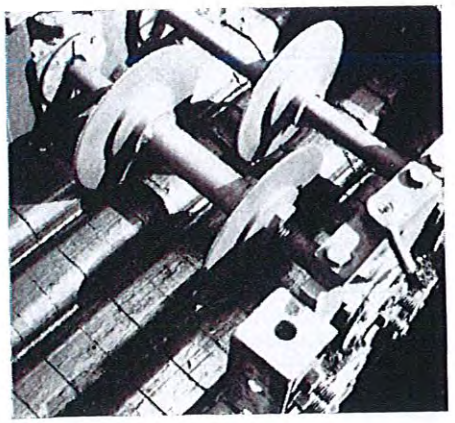
The process of briquetting consists essentially of crushing, screening, drying, cooling and pressing the coal. By this means the high-moisture coal is converted into hard, durable, moulded blocks of compressed fuel with more than three times the heat value pound for pound of the original raw coal.

At Yallourn raw brown coal for briquetting, discharged by electric trains into bunkers in the open cut, is delivered to a primary crusher by conveyor belt. The coal then passes through various crushers and screens, the small sized coal passing to steam-heated driers and the large sized coal to the boilers.

The driers are large rotating cylinders containing several hundred tubes and set at a slight angle to the horizontal. The moist coal is fed into the tubes, around which circulates low pressure exhaust steam from the turbo-generators in the power plant associated with the briquette works. As the coal slowly



Yallourn Briquette Works



gravitates through the tubes, most of its moisture content is evaporated and the coal emerges in a hot and comparatively dry condition. The hot coal is removed by screw conveyors, screened and then taken to the top of a cooling house where it cools while passing down through a system of staggered louver plates. It is then conveyed to the press hoppers for briquetting.

The briquettes are formed in extrusion presses. As each bar of briquettes comes from the press it pushes the bar before it forward in a steel trough or "launder". Revolving discs or cutters break these bars into single briquettes which are delivered by conveyor belt to railway trucks for transport to points of use. About four tons of raw coal, including boiler coal, make one ton of briquettes. The process takes about $3\frac{1}{2}$ hours.

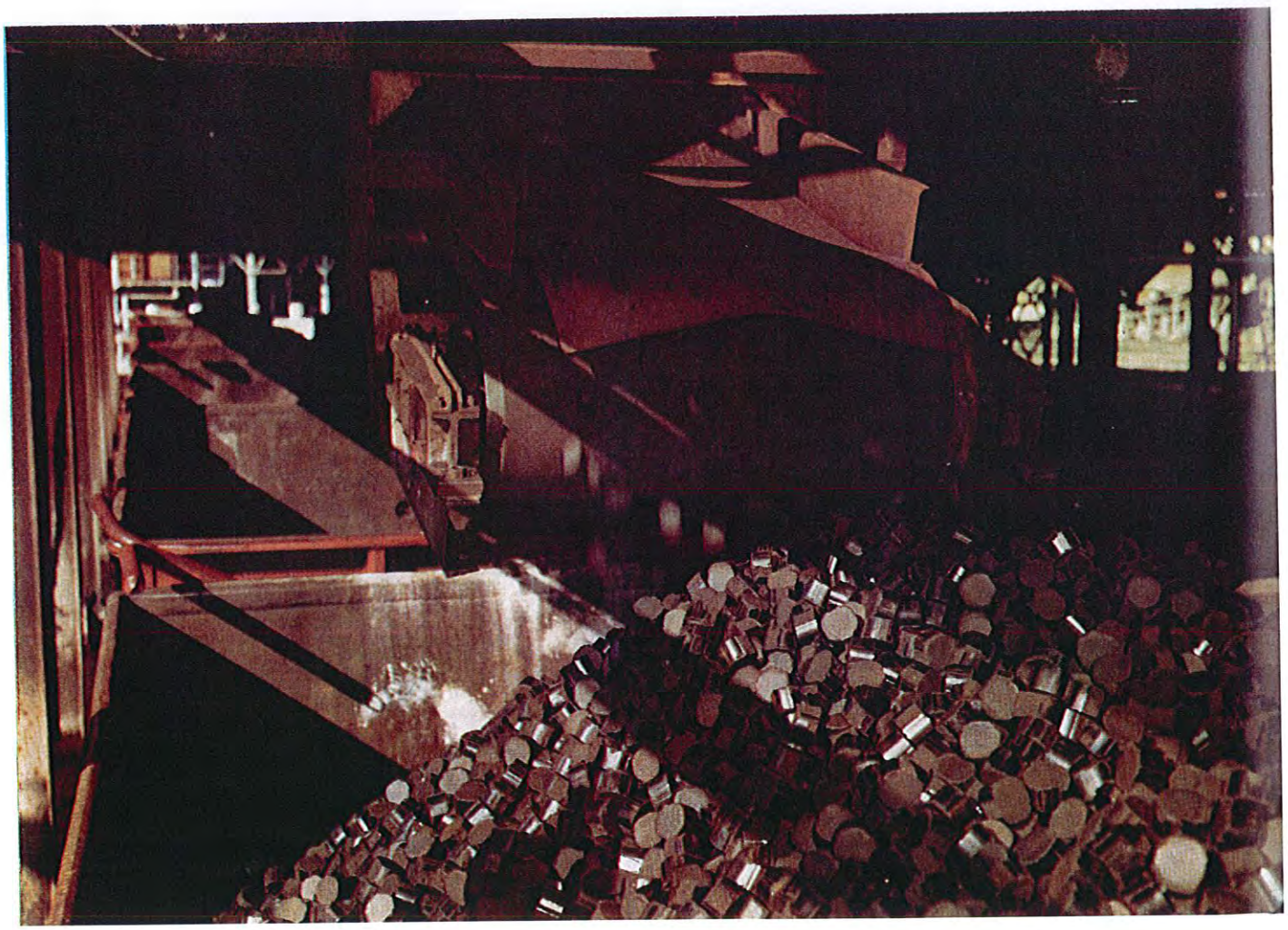
Of special interest at Yallourn is the experimental packaging plant for "H" type (household) briquettes. Developed in Australia, this semi-automatic machine began operation in 1960, producing easily handled paper-wrapped packs containing 36 briquettes.

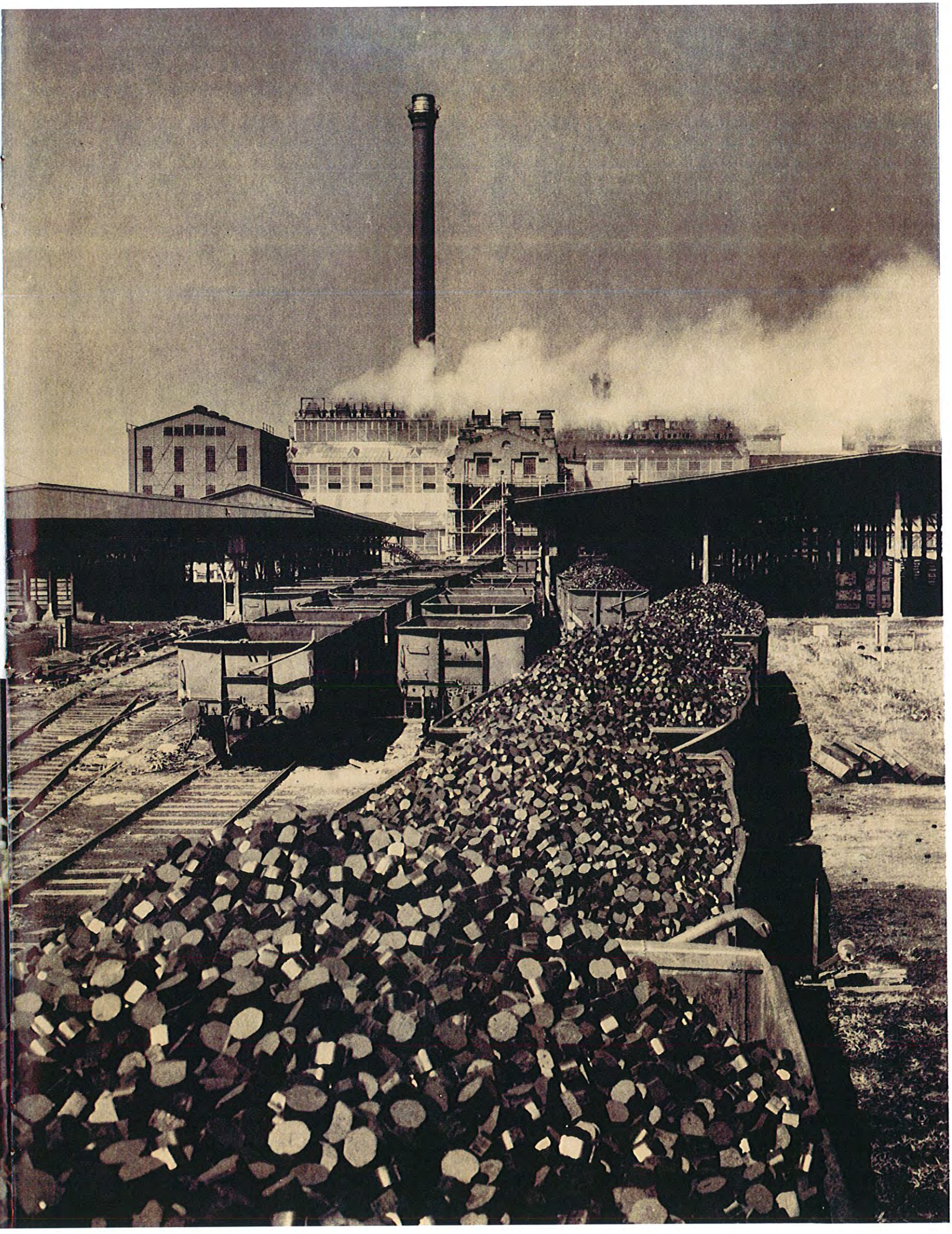
Annual output of the Yallourn works exceeds 600,000 tons. The works consist of three factories — "A", which came into commercial operation in 1925 with steam-driven single presses, and "B" and "C", which have electrically-driven twin presses and (in "B" factory) a quadruple four-stamp press. The associated power plant (totalling $21\frac{1}{2}$ megawatts) provides power and steam for driving the processing plant and equipment. Surplus power is fed into the State supply network through the Yallourn switchyard.

Above: Cutting bars of briquettes into separate briquettes during their passage along the launders

Right: Loading briquettes by conveyor belt into railway trucks

Opposite page: Loading bays and Victorian Railways marshalling yard, Yallourn Briquette Works





THE TOWN

Pioneering the Yallourn undertaking in a place that was previously virgin bushland demanded the creation of a town within easy access of the open cut, power station and briquette factory for the housing of the workers and their families.

In 1921 a comprehensive plan for the building of a township was drawn up by the Commission. By 1924, the year in which the power station came into operation, the town of Yallourn had a total of 143 houses with 68 others in course of construction, church buildings and a school almost finished. There was a four-acre nursery for the propagation of trees for street planting and general afforestation, a brickworks and a tile-making plant.

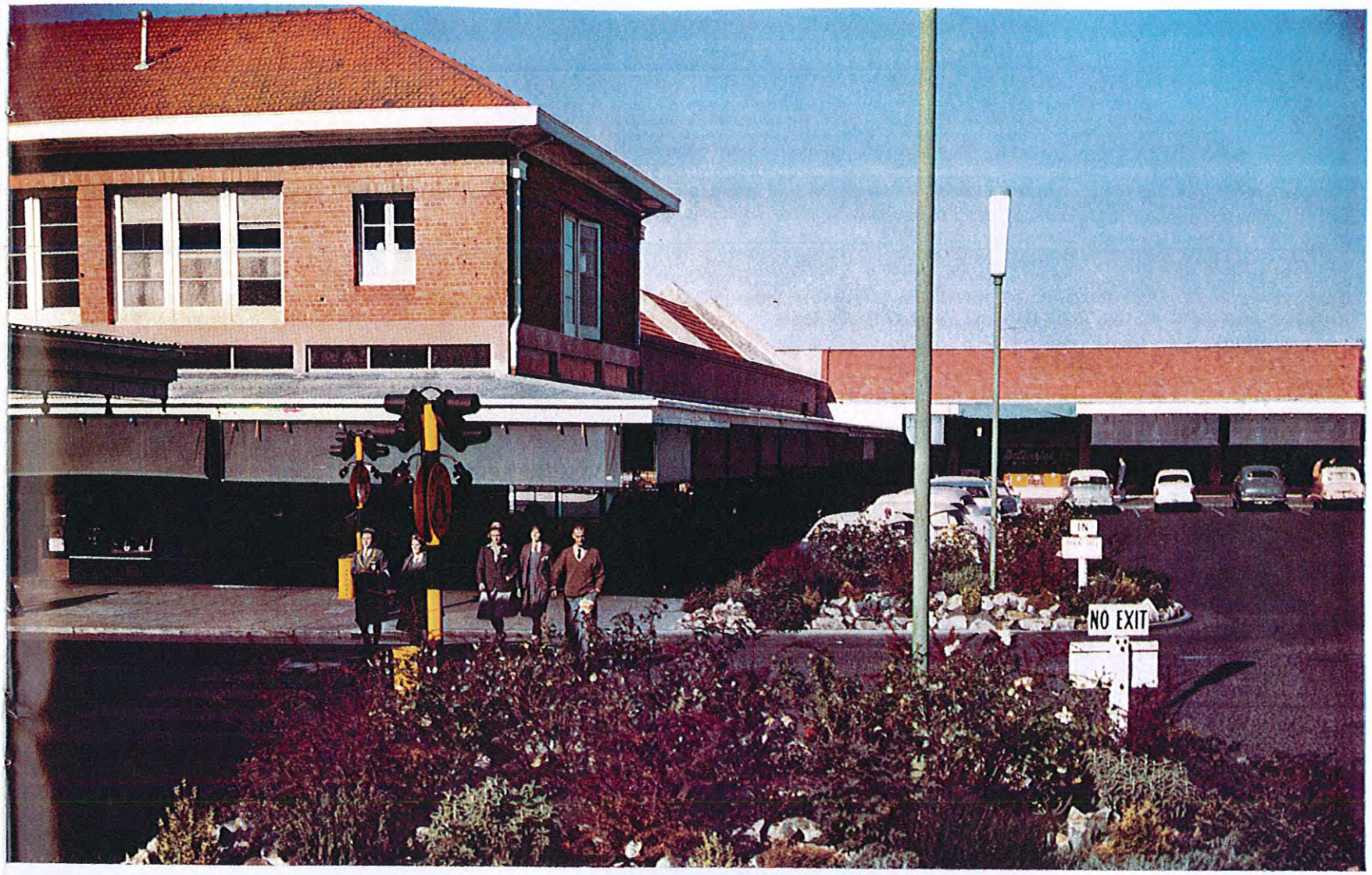
The early promise was fulfilled. With a present population of over 5,000 Yallourn has become a charming town proud of its tree-lined streets and of its gardens. It bears no resemblance to the grim industrial settlements of other years and places.

Today Yallourn has about 1,100 houses in addition to hostels, boarding houses, hotel, shops and community buildings catering for the cultural and recreational needs of the population. The town is owned by the Commission, except for buildings such as churches, schools and banks, and some commercial premises.

Public buildings and shops are arranged about the centrally situated Monash Square, containing memorials to General Sir John Monash (Commander of the First A.I.F. and Chairman of the Commission in its vital formative years) and to those who fell in the Second World War. In Monash Square, too, is the public hall, named Kernot Hall, after the late C. H. Kernot, the Commission's construction engineer at Yallourn in its earliest days and its chief engineer on his retirement after 30 years' service.

The Yallourn public library, built by the Commission, includes a well equipped technical library, a children's library and a community room for public meetings and documentary film screenings. About 1,100 day and night students attend Yallourn Technical College and nearly 600 day students attend the

Memorial to Sir John Monash, Monash Square, Yallourn



Part of the shopping centre, Monash Square, Yallourn

One of the ovals at the Yallourn sports centre

Looking across the town to the briquette works

Infant Welfare Centre in Broadway Gardens

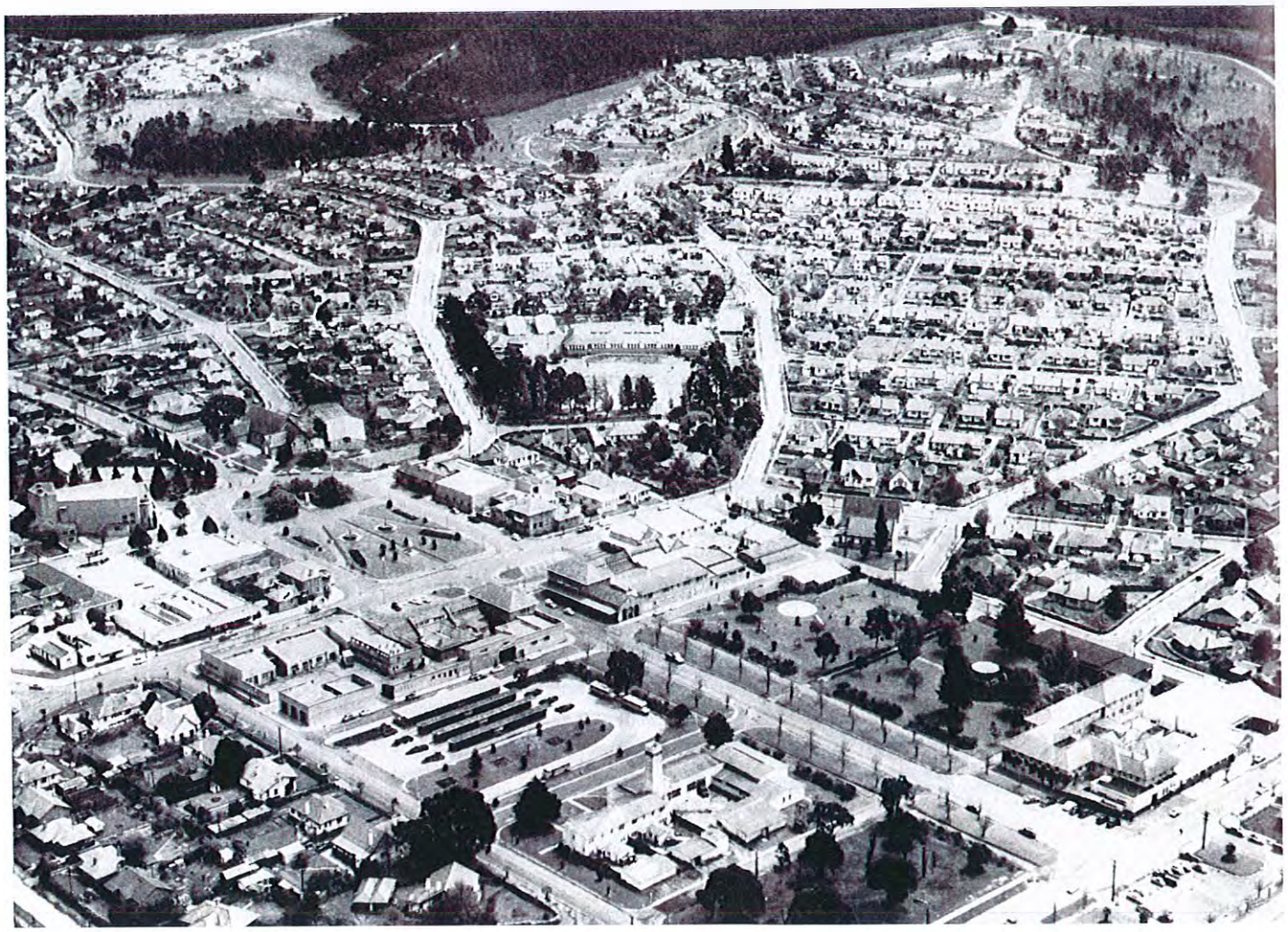
Junior Technical School in the nearby township of Newborough. Over 700 students attend the Yallourn High School. In addition, there are three other schools — a primary school, a Roman Catholic school and a pre-school kindergarten. Community services include an infant welfare centre and pre-natal clinic and the Latrobe Valley Community Hospital. Sports facilities include four sports ovals, a swimming pool and a golf course.

Within the Yallourn works area, comprising the town of Yallourn, the open cut, power station and briquette works, the Commission itself exercises the powers of a local government authority. In the administration of the town of Yallourn the Commission is advised by the Yallourn Town Advisory Council, which consists of a chairman nominated by the State Government, three Commission nominees and three members elected by the townspeople. The Council can make by-laws and submit recommendations concerning the general welfare of residents.

In the Yallourn works area large hostels are maintained for men who want single accommodation — the biggest of these, Eastern Hostel, has accommodation for about 650 men. Outside Yallourn there are in the neighbourhood two large housing estates where the Commission has built many hundreds of homes for rent or sale to married employees. One is Yallourn North where an old township has been rebuilt and enlarged. The other is Newborough where a complete township of nearly 680 houses has been established.

Typical Yallourn street in autumn

The town of Yallourn



THE FUTURE

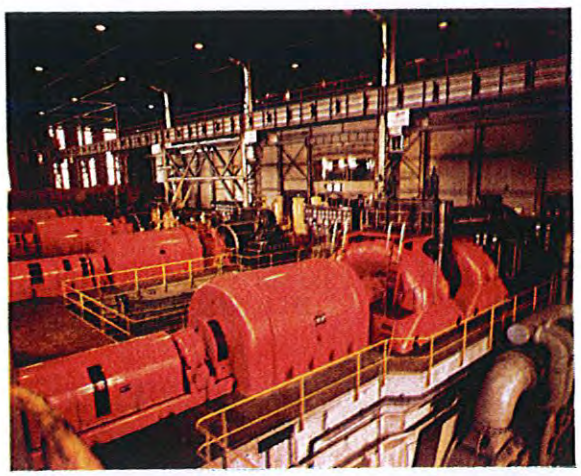
This description has been concerned essentially with Yallourn — its open cut, its power station, its briquetting factory and the town which serves it. Yallourn was the first development on the brown coal fields and exists as an entity in its own right — an increasingly important entity. But today it must be seen also as part of an even greater complex which includes Yallourn itself, Morwell and Hazelwood, and will include other centres in years to come as Victoria's power requirements grow.

The Morwell undertaking, which takes its name from the town and Shire of Morwell, is, in a sense, a second Yallourn for it is concerned with the production both of electric power and briquettes, and includes a large open cut. Morwell is linked with Yallourn by the Commission's own narrow gauge electric railroad, and through its location on the main Gippsland line is connected with the general State railway system. Installed capacity of Morwell Power Station is 170 megawatts. The capacity of the briquette works, 1,300,000 tons annually, is more than double the capacity of the pioneer factory at Yallourn.

From Morwell brown coal briquettes are supplied to the neighbouring plant of the Gas and Fuel Corporation of Victoria where gas is produced by the Lurgi process from briquettes and delivered by pipeline to Melbourne and other centres.

South of Morwell the State Electricity Commission is building a third great undertaking, Hazelwood Power Station, which will operate on brown coal delivered by belt conveyor direct from

Morwell Open Cut

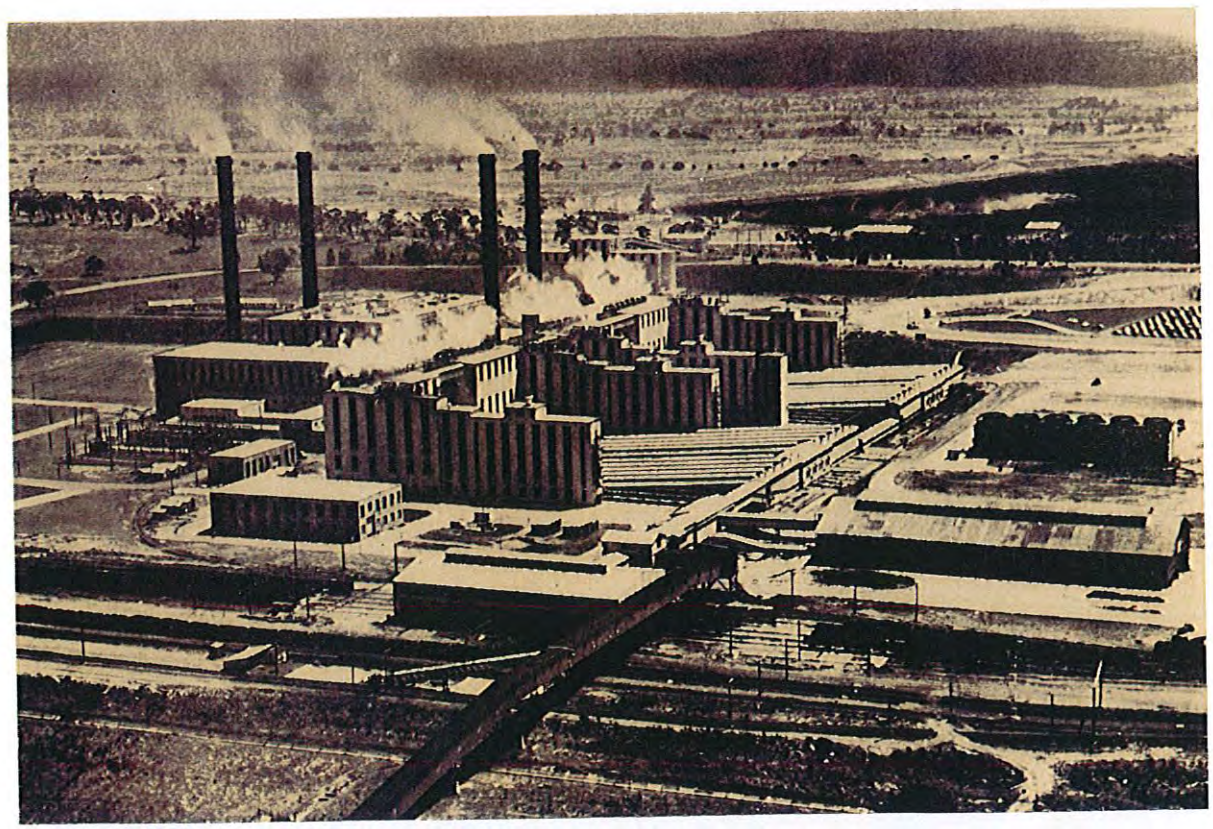


Turbine Room, Morwell Power Station

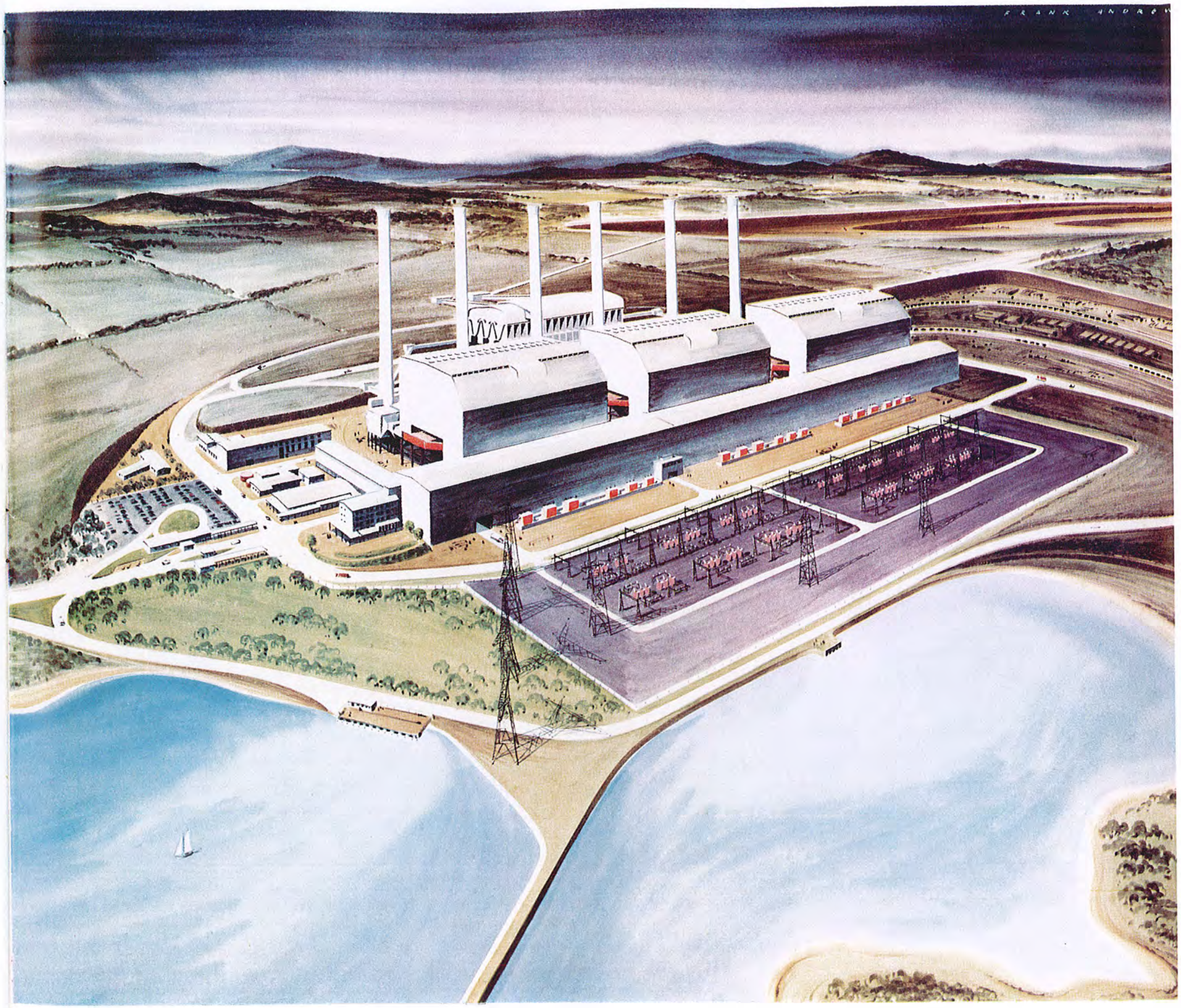
the Morwell open cut. Hazelwood is planned, on completion in 1971, to have an ultimate capacity of 1,200 megawatts, comprising six turbo-generators, each of 200 megawatts capacity, the first of which will be in service in 1964. The capital cost of the complete Hazelwood Power Station is estimated at £90 million, with an additional £20 million for new high voltage transmission facilities and £10 million for extending and equipping Morwell open cut.

For future base-load power stations to follow the completion of Hazelwood Power Station the Commission has the choice of several locations in the Latrobe Valley. In addition to the extensive reserves of available brown coal there are, in the region, sufficient water supplies from the Latrobe River and its tributaries for greatly expanded power development. Investigations are now proceeding to determine the best sites and priority of development with regard both to proximity of coal deposits and available water resources.

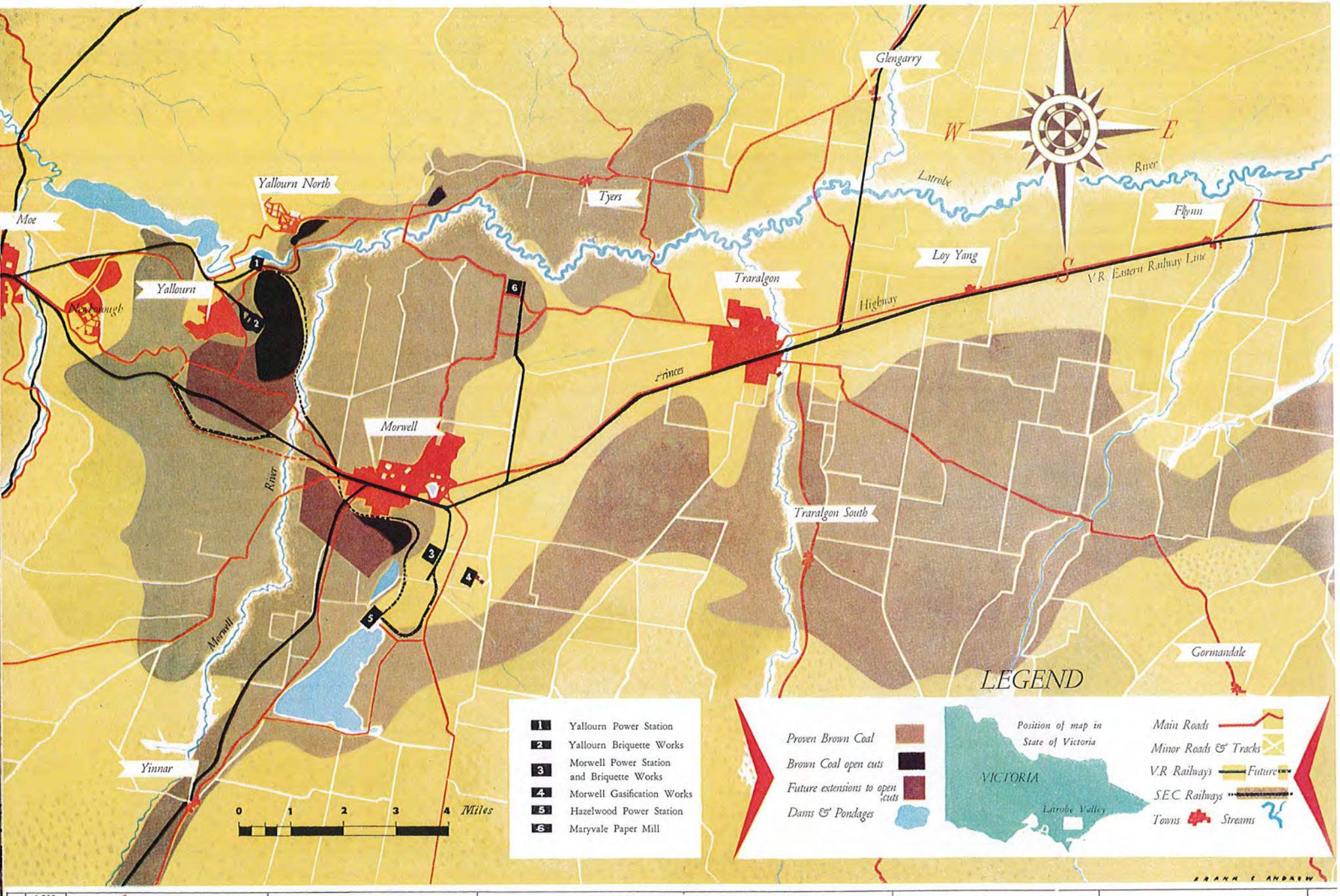
The installed capacity of power stations in the Latrobe Valley is planned to increase from the present total of approximately 800 megawatts to 2,000 megawatts in 1971 and is expected to increase to about 11,000 megawatts by the year 2000. During the same period the quantities of brown coal required by the Commission are expected to increase from the present 16 million tons a year to about 25 million tons in 1971, and to more than 100 million tons a year by the end of the century.

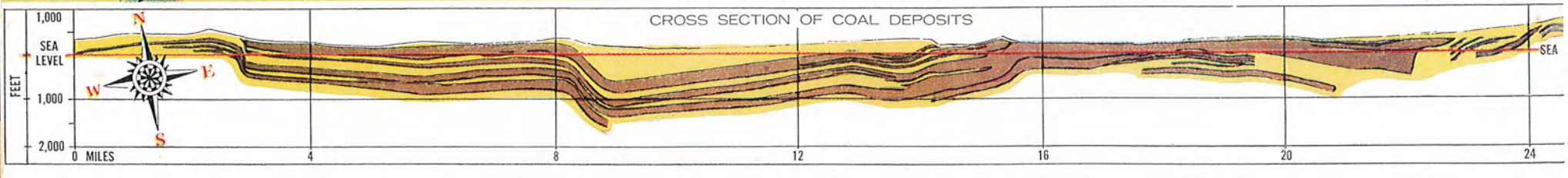


Morwell Power Station (left) and Briquette Works (right)



Hazelwood Power Station—an impression of how it will appear on completion in 1971





LATROBE VALLEY BROWN COAL RESOURCES

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