

INTRODUCTION

Raw gas production commenced from the Cooper Basin in 1969 and, at 30 September 1997, 85 gas fields with a total of 354 wells were on-line (Fig. 1.2). A combined total of ~190 PJ (150 bcf) of Cooper Basin sales gas destined for markets in South Australia and New South Wales was sold in 1997. Of this, ~20 PJ were sourced from South-West Queensland¹.

The first crude oil production began in December 1982 from Eromanga Basin reservoirs in the Strzelecki Field. At 1 November 1997, 28 oil fields with a total of 118 wells were on-line (Fig. 1.2). During 1997, ~0.6 million kL (3.8 million bbl) of crude oil, 0.4 million kL (2.5 million bbl) of condensate and 0.3×10^6 tonnes of LPG were sold.

The Cooper Basin Liquids Project was initiated in 1980 and completed in stages from 1982 to 1984 at a cost of \$1.6 billion (\$1997). The project involved construction of a high vapour pressure liquids pipeline from Moomba to a processing plant and storage and loading facilities at Port Bonython, as well as field development, oil collection and crude stabilisation facilities at Moomba.

Shipments of crude oil and condensate commenced in 1983, and LPG handling facilities were commissioned in July 1984. This enabled the Producers to bring the 'wet' gas reservoirs (those containing significant quantities of propane, butane and condensate) into production, which further enhanced production flexibility. Condensate production was replaced by naphtha production at Port Bonython in 1991.

INFRASTRUCTURE

Production facilities

A total of 5090 km of pipeline has been laid from the Cooper Basin to gas markets in New South Wales and South Australia, and the liquids load out facility at Port Bonython (Fig. 1.3). Key pipelines in the region are the Moomba – Port Bonython Liquids Line and the Moomba–Adelaide Pipeline, operated by Epic Energy, and the Moomba–Sydney sales gas and ethane pipelines, operated by East Australian Pipelines. The Moomba–Adelaide Pipeline is 781 km long, has an outside diameter of 560 mm and a maximum allowable operating pressure (MAOP) of 7300 kPa. A further 517 km of lateral extensions to the main line service markets in country South Australia, including the Port Pirie, Whyalla and Riverland regions. The Moomba – Port Bonython Liquids Line is 659 km long, has an outside



Aerial view of a tanker loading at Port Bonython. (Photo 40416)

diameter of 356 mm and a MAOP of 10 380 kPa. Sales gas is sold to New South Wales markets via a 1760 km network of transmission pipelines (diameter 864 mm, MAOP 6200 kPa), while ethane is provided as feedstock for a petrochemical plant in Sydney via a dedicated 1300 km pipeline (diameter 219 mm, MAOP 15 300 kPa).

Gas emerges at the wellhead at pressures up to 25 000 kPa and temperatures up to 120°C. Gas from individual wells passes via field gathering systems (flowlines) to field satellite stations which separate gas, free water and condensate. Water disposal can be a major issue



Beam pumps producing oil, Merrimelia Field. (Photo 45016)

¹ Statistics provided in this chapter are listed in regular reports to PIRSA from the Cooper Basin Producers and are maintained in Departmental databases (e.g. PEPS).

for oil production, and is achieved via evaporation ponds at the satellites. The essentially water-free gas and condensate pass to the central Moomba treatment plant through trunklines. Crude oil is transported by either pipeline or truck to Moomba. Nine oil and 11 gas satellites are currently in operation in the Cooper and Eromanga Basins; ~1010 km of trunklines and 1135 km of flowlines have been laid.

Any free condensate and water are removed from the raw gas by slug catchers at the Moomba plant. The gas stream then proceeds to the CO₂ Benfield plant to ensure that no greater than 3% by volume of CO₂ remains in the sales gas stream. The gas is dehydrated at the molecular sieves before proceeding to the liquid recovery plant where 100% of the remaining condensate, 98% of the LPG (C₃ and C₄) and 75% of the ethane are removed, leaving sales gas for Adelaide and Sydney with a heating value not less than 37.5 MJ/m³. Approximately 8% of the sales gas is used as plant fuel at Moomba. The plant has been designed to process 25.4 million m³ (900 mmscf) of raw gas and 6000 kL (42 000 bbl) of condensate and crude oil per day. Condensate, LPG, crude and some ethane are transported as a 'cocktail' via pipeline to Port Bonython where they are separated and marketed.



Construction of Della trunkline. (Photo T15557)



Cooper Basin satellite facilities. (Photo 43790)



Carbon dioxide removal towers, Moomba. (Photo 43373)

The feedstock delivered to Port Bonython is sampled, filtered and metered, then pumped through fractionating towers to separate ethane (used as fuel gas for the plant), propane, butane, light, intermediate and heavy naphtha, and reduced crude. Once cooled to ambient temperature, naphtha and reduced crude fractions are mixed together in precise ratios. The resulting two products — naphtha and crude oil — are sent to storage tanks.

When loading to a ship, the products (crude, naphtha, butane or propane) are pumped along the 2.4 km jetty then conveyed through hydraulically controlled loading arms into the ship tanks for transport to Australian refineries or overseas.

A local destination for Cooper and Eromanga liquids is the refinery at Port Stanvac, 10 km south of Adelaide, which produces petroleum products mainly for the South Australian market. The refinery commenced operations in 1963 and the adjacent lubricating oil refinery began producing in 1976. The main products are LPG, solvents, motor gasoline, jet fuel, kerosene, diesel (both automotive and industrial), lube oil basestocks for Australian and overseas markets, fuel oil and bitumen.

Services in the Cooper Basin

Accommodation and support facilities are located at the Moomba plant. These are operated by the Cooper Basin Joint Venture and are not open to the public; access is by arrangement with the operator.

The existing Moomba camp can accommodate 450 people; an additional 150 beds are currently mothballed. A full range of support services is located at Moomba, including, logging, wireline, fracing, cementing, transport, fuel supply, aviation (including helicopter) and emergency services. The sealed airstrip at Moomba is 1720 m long, and is large enough to accept medium-sized jets.

The production facilities are connected by a series of unsealed 'private' roads, comprising 460 km of main road and 1860 km of access roads, which are maintained by the operator. Some of the public roads in the area are maintained by the operators and the remainder by the Department of Transport.

The township of Innamincka, 65 km northwest of Moomba, is a popular tourist destination. The district office of the National Parks and Wildlife Service is located in the town, along with a hotel, general store, and light-aircraft



Moomba processing plant, Cooper Basin. (Photo 43803)

airstrip. The causeway at Innamincka provides the major crossing point for the Cooper Creek, which in times of flood is impassable by vehicle.

Transport links

Adelaide (population 1 million) lies ~800 km south of Moomba, and Alice Springs in the Northern Territory is over 500 km to the northwest. Port Augusta is the nearest port (~500 km to the south-southwest). The Birdsville and Strzelecki Tracks are unsealed but provide important routes for heavy transport into the region. Most towns, the Moomba plant, a number of satellites, and station properties have air strips.

Other industries

The northern part of South Australia is sparsely populated and is relatively undeveloped due to its remoteness and harsh climate. The main primary industry is cattle which are run on large pastoral leases. Tourism (especially ecotourism) is a growing industry in the region — Innamincka provides a staging point to the Innamincka Regional Reserve, Strzelecki Regional Reserve, and the Coongie Lakes wetland system.

Groundwater

The location, yield and quality of water supplies are critical for operations in the harsh climate of northern South Australia. The Eromanga Basin encloses the multi-aquifer system of the Great Artesian Basin (GAB), one of the world's largest groundwater basins (Habermehl, 1980). Groundwater of the GAB is used by the petroleum and mineral exploration industries, pastoralists and the tourism industry. The shallowest aquifer is ~1000 m deep and provides a guaranteed supply of potable water. More saline water may be intersected in a shallower Quaternary–Tertiary aquifer (Table 4.1). Details of properties of individual bores can be obtained via the SA_GEODATA database.

Table 4.1 Groundwater resources of the Moomba region.

Aquifer	Great Artesian Basin	Quaternary–Tertiary
Depth	>1000 m	<250 m
Surface pressure	900 kPa (i.e. free flow)	0 kPa (i.e. requires artificial lift)
Salinity	1000–3000 mg/L	1000–40 000 mg/L
Flow rate	>36 ML/day	0.1–1 ML/day

Access to bores must be negotiated with the owner, which may be the pastoralist, a petroleum exploration company or the Department of Transport. Bores drilled specifically for water require licensing under the *Water Resources Act 1997*.

ACCESS TO MARKETS

A free market was introduced in 1988 for all oil and condensate produced in Australia. There is no restriction on imports or exports of crude oil or refined petroleum products. A similar regime has applied since 1991 for LPG.

Ex-field natural gas prices in South Australia are also freely negotiated between buyer and seller. There are regulative rights of third party access to gas transmission and reticulation pipelines. Issues relating to rights of access to Cooper Basin processing plant and related infrastructure are currently under consideration.

Markets for crude oil and condensate exist locally, and discoveries in the Cooper and Eromanga Basins are of the highly desirable low sulphur light crude oil type which finds a ready domestic and overseas market.

