

# 125 years of the Geological Survey of South Australia: 1882–2007

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## The mining tradition

January 1837 saw the arrival of the first geologist in South Australia — Johannes Menge was a German mineralogist employed by the South Australian Company as Mine and Quarry Agent and Geologist to investigate the potential for water supplies, coal, minerals and quarries. Of significance at this time was the degree of recognition that was being accorded to the emerging science of geology — Charles Lyell's innovative *Principles of geology* was published (1830–33), the first geological lecture course at the University of London had begun in 1831 and the Geological Survey of Great Britain was founded in 1835. In keeping with this trend, in 1834 the South Australian Literary and Scientific Association discussed the geology and natural history of 'Australia'.

But it was the accidental discovery of copper and silver–lead that began South Australia's first mining boom with Wheal Gawler at Glen Osmond in 1841. Copper was king in the decades following with discoveries and working of copper ores at Kapunda (1842–78), Burra (1845–77) and Moonta–Walleroo (1860–1923) being prominent.

Other irregular discoveries combined with the competitiveness of private

enterprise fulfilled the needs of the colony for many years, especially as the government and the community equated the public interest with private profit, and negated the need for organised or coordinated geological work. The early colonial administrators maintained an interest in the mineral potential of the colony but the Crown, as in other colonies, did not possess the rights over minerals under common law. By tradition and practice, the rights to 'all above and below the surface' were vested in the landowners. The Crown only retained the mineral prerogative over the so-called royal metals — gold and silver.

Thomas Burr, the Deputy Surveyor-General from January 1840 to October 1847, examined the colony's geology and mineralogy whenever possible. His observations resulted in the first official government geological report.

In March 1846 a Crown royalty on the value of the production of metal ores from Crown land was applied. James Trewartha was appointed Government Mine Surveyor and Toller of Crown Lands in November 1847, but his duties as Toller ceased the following August when the royalty was removed. A year later he resigned as Mine Surveyor.

*At the end of 1914 the Geological Survey undertook a trip to the far northwest of South Australia. The expedition, led by Robert Lockhart Jack (Assistant Government Geologist), was not only a geological survey but also a search for water, minerals and pastoral land. Accompanying Jack were Captain SA White (Biologist at the South Australian Museum), JP Rogers (White's privately employed assistant and taxidermist), WH Williams and R Nicholls (two experienced prospectors), GF Dodwell (Government Astronomer) and some Aboriginal youths. The picture shows Jack's party leaving for the Musgrave Ranges from Indulkana Station at Wantepella Well. Dodwell is in the lead with his dog, Speck, not far behind. (Photo N000679)*

Before the gold rush to the eastern colonies in the 1850s, a Government Geological and Mineralogical Surveyor was appointed. However, when Benjamin Herschell Babbage arrived in November 1851 to take up this position, he was made a Gold Commissioner, then Government Assayer, until he resigned in February 1853 without having undertaken any geological surveying. There matters remained for the next three decades with only cursory surveys undertaken by the likes of Babbage and Alfred Selwyn (Victoria's Government Geologist, 1852–69, who visited in 1859) until a Geological Survey was established.



Eager investors and speculators mill outside the Stock Exchange of Adelaide, King William Street, Adelaide, in 1895 or 1896. The former Stock Exchange of South Australia stands next door. (Courtesy of the State Library of South Australia; PIRSA photo 033738)

In 1861 George Woodroffe Goyder became the government’s Surveyor-General and its first Chief Inspector of Mines. Discoveries of gold in the latter part of the 1860s at Echunga (following earlier ‘rushes’ there in the 1850s) and the Barossa Range led to the creation of a Warden of Goldfields Office in 1868.

The assertion of Crown rights to minerals in other Australian colonies during the 1870s was not implemented in South Australia then: Parliament legislated in 1877 to preserve the colonists’ claim to individual, and not public, rights to the ownership of minerals. At this time the Adelaide Philosophical Society (later the Royal Society of South Australia) invoked the government to undertake a geological survey of the colony, a move instigated by Ralph Tate, the Professor of Natural Science at the University of Adelaide.

By the 1880s private enterprise was no longer prepared to accept the responsibility for developing the

### Significant firsts in Australia

South Australia lays claim to being the first colony in Australia where mining was important:

- first reported opal discovery (Barossa Valley, c. 1840)
- first metal mine (Wheal Gawler, 1841)
- first company mining town (Burra, 1845)
- first gold mine (Montacute, 1846)
- first official government geological report and the first geological book to be published in Australia (Thomas Burr’s *Remarks on the geology and mineralogy of South Australia*, 1846)
- first metalliferous mine in Australia to pay dividends (Burra, 1847)
- first industrial strike in South Australia, and the first one of significance in Australia (Burra, 1848–49)
- first drilling for oil (Salt Creek – preliminary 1866, to depth 1881–83)
- first reported uranium discovery (Adelaide Hills, 1890).

mineral resources and resorted instead to investment and speculation, within and outside the colony, as its principal form of economic activity in the mining industry. Given the availability of gold and other rich mineral deposits in other colonies,

South Australia often lost its skilled miners and investment capital: there was much ‘mining on the Exchange’, with the spectacular successes of Broken Hill (1883) and Kalgoorlie (1893) being aided by the local markets.

## Beginnings of the Geological Survey

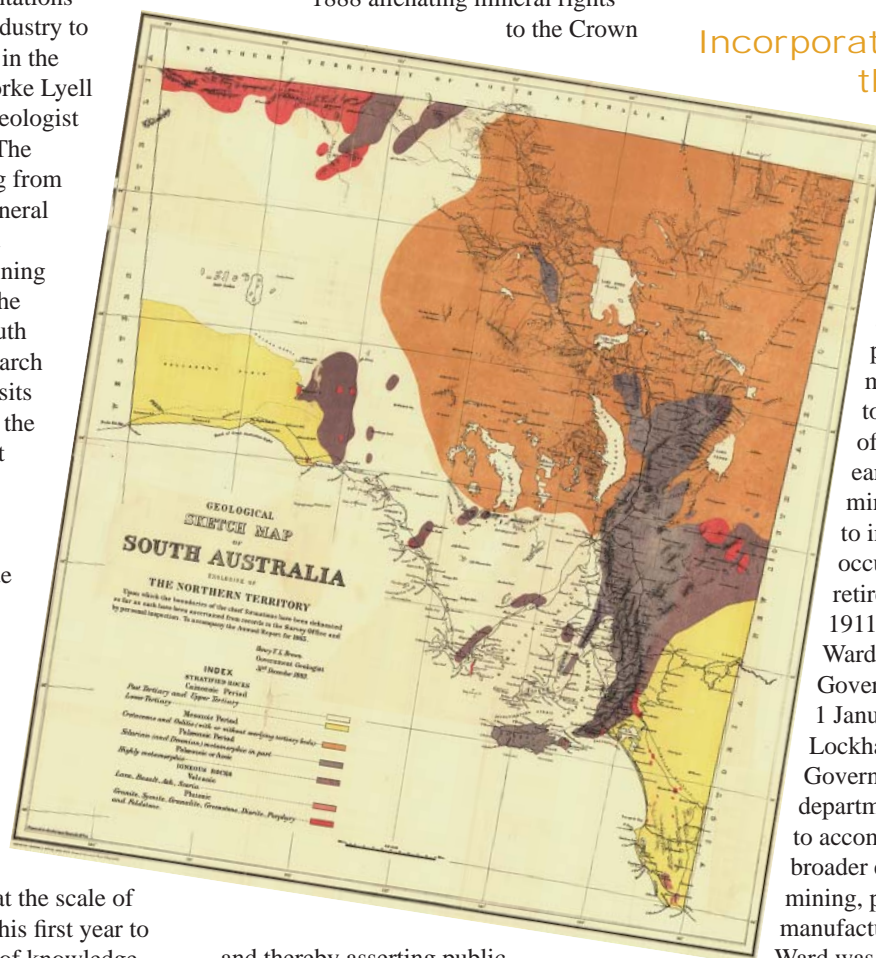
As private enterprise failed to match the expectations of the public, especially during succeeding times of adverse economic circumstances, the government increased its involvement in looking for minerals. In 1882 another extensive campaign in the press urging the appointment of an official geologist, again supported by the representations of Tate and the mining industry to the government, resulted in the appointment of Henry Yorke Lyell Brown as Government Geologist from 1 December 1882. The colony was then suffering from the effects of drought, general economic depression and stagnation in the local mining industry. Under Brown, the Geological Survey of South Australia set about the search for payable mineral deposits and water supplies, since the lack of water of sufficient quality was a perennial problem. With major silver–lead–zinc deposits at Broken Hill just outside its eastern border, there was an expectation that a geological survey of the colony would help overcome the downturn in the local mining industry.

Brown published his first geological sketch map of South Australia (at the scale of 1-inch to 16-miles) after his first year to bring together the extent of knowledge about South Australia's geology. Detailed revisions of this map followed in 1886 and 1899.

The Geological Survey was intended to assist the mining, pastoral and agricultural industries by opening new areas for development by private enterprise and for new investment opportunities. But Brown was left to toil with the demanding duties of exploration and administration with little assistance: although it was widely acknowledged that he operated under difficulty and with a want of efficiency, nothing was done to facilitate his task. On the contrary, occasional attempts were made to abolish the Geological Survey. Brown was ever cautious about mining investment and speculation in unproven deposits, a fact that all too often annoyed

those who preferred to do their 'mining on the Exchange'.

By now the general community had accepted the notion that the mineral wealth of the colony was public property rather than belonging to a small, sectional interest group. To ensure that society benefited as a whole from the development of the mineral resources, parliament passed legislation in 1886 and 1888 alienating mineral rights to the Crown



and thereby asserting public ownership of the rights over minerals.

The private sector then sought government assistance to stimulate the stagnant mining industry. The standstill in the industry was of such concern that a Royal Commission on Mining was conducted in 1890. The *Mining Act 1893* was one result. Another Royal Commission recommendation, in line with a report by the Public Service Commissioners in the same year, was for the establishment of a consolidated body to regulate and encourage the industry. Although there had been antecedents, with the same or similar title, as branches of other departments, the Department of Mines formally came into being on 28 February 1894 with the introduction of the Act.

Through the Department of Mines, government assistance to the mining industry was soon to include financial subsidies, rewards for discoveries, allowances and rebates, the provision of support facilities such as drills and batteries, the selection of sites and the inspection of mines. The department administered the legislation, while the Geological Survey maintained its exploratory role.

## Incorporation into the Mines Department

In 1912 the Department of Mines and the Geological Survey were officially combined in a further attempt to stimulate private enterprise — mining activity continued to lag behind the levels of activity of those earlier days of copper mining. The opportunity to implement this reform occurred with Brown's retirement at the end of 1911. Following Keith Ward's appointment as Government Geologist from 1 January 1912, with Robert Lockhart Jack as the Assistant Government Geologist, the department's interests expanded to accommodate questions of a broader economic nature for the mining, pastoral, agricultural and manufacturing industries. In 1916 Ward was also appointed the first Director of Mines and in the following year he was officially made the head of the department.

By exerting such direct involvement in the industry, successive governments had to frame policies for the development of mineral resources. The consolidated organisation was charged with the administration of mining and quarrying activities and of an emerging petroleum industry, with the undertaking of exploratory and scientific surveys, and with encouraging the development of mineral and water resources. In the aftermath of World War I the mining industry's interests diversified: some of the new-found Coober Pedy opal was introduced to the world market; gypsum, limestone and dolomite deposits provided

supplies for plaster, chemical, cement and steel industries; salt was produced for an alkali works; companies mined and treated radioactive ores; further potential water supplies and reservoir sites were examined, and exploration for petroleum became of increasing importance.

The onset of the Great Depression in South Australia in 1927 again highlighted the necessity for the state to have a broader economic base beyond its substantial agricultural and pastoral sectors. The mining sector had obvious potential to contribute to industrial growth. Ward therefore directed much of the department's work towards linking the mining and manufacturing sectors. Throughout Ward's time in office to February 1944, however, the department was starved of funds, facilities and personnel to implement his ideas in full.

### An expanded role

The substantial growth of the department from 1945 reflected the increasing demands on its services, new technologies and methodologies, and the greater diversity and specialisation of the mineral and energy resources sectors. At its peak prior to 1944 the department comprised less than 30 salaried and daily paid staff: in 1932, for example, there were 26 people on the staff books, excluding prospectors but including

caretakers, battery hands, drill crews, office staff, Inspectors of Mines and the two geologists. Under wartime exigencies the number of staff in the department fluctuated: in 1945 the salaried and professional officers had risen to 24, including four geologists.

Opportunities to expand the department, especially the Geological Survey, were presented by the diversification of activities. From near the end of World War II and into the 1960s the department initiated regional geological mapping; introduced aerial photography to survey work; searched for uranium at Mount Painter; delineated Leigh Creek coal deposits (in conjunction with the Electricity Trust of South Australia); undertook seismic surveying; investigated oil and natural gas potential; administered and operated the Radium Hill Mine; established a Research and Development Branch that later became the world-renowned Amdel; expanded its Works Depot to incorporate a statewide drilling service to search for minerals, coal, petroleum and water; examined extractive minerals and construction supplies (especially for the post-war housing and building shortages); and searched for a range of metallic and non-metallic mineral resources, including water, copper, pyrites and opal.

The department grew rapidly as these activities intensified. At the end of 1953 the staff number of 383 included 226 professional officers — 16 times the number of staff nine years before! The responsibilities of the department were then administered in several branches — Geological Survey, Survey Laboratories, Mining and Inspection, Chemical Engineering, Metallurgical, Mechanical and Boring, Administration and the Radium Hill Project.

This rapid growth highlights the key role that the department played in the government's expansionary programs led, in large part, by Premier Sir Thomas Playford, whose personal involvement in, and encouragement of, development plans was renowned. Ironically, Playford's grandfather, when premier in 1891, had criticised the need for a Geological Survey, once telling parliament that the government could not afford to map the mineral resources of the colony. He apparently did not consider that benefits might accrue from a scientific survey.

Most of the staff in this era were young: the Geological Survey's professional staff were often new graduates from university or recent migrants from Europe. Many of the key people had great drive, vision, energy and enthusiasm for achievement: to endure the hardships of a field geologist's life then required a robust constitution, stamina and solid physique, physical attributes which can be seen in photographs of the young geologists. Those who remained with the Geological Survey gave it the stability, continuity and experience it needed to cope with the rapid developments that took place in the mining boom of the 1960s.

### Impact of industry trends

The downside of the general mining boom of the 1960s for the Geological Survey was that key personnel became more desk-bound administrators than the field researchers of earlier days. However, the special emphasis on development enabled the Geological Survey, through its quality work, to establish a reputation as being among the best, if not the best, in the country. Such a claim can be difficult to verify, but the important thing is that it was a commonly held belief and served as a motivating factor to the daily work.

This mining boom saw discoveries of copper, lead-zinc, uranium, oil and



*Seismic survey party heading to the Boorthanna Trough in the northeast in 1968. Bernie Milton, leader of the convoy, with 'the troops' in line near Port Wakefield. Milton's military background had beneficial effect on his methods in running the survey crews: it made for orderly camp sites and efficient decamping and rapid removal to new sites. Everything was on wheels (e.g. sleeping and office caravans, mess, kitchen, workshop and power supply), with most of the equipment devised and manufactured at the department's Thebarton workshops. (Photo 049693)*

*The evolution of government appointments in geological and mining matters in South Australia*

| DATE*   | GEOLOGICAL   | MINING  |
|---------|--|---|
| 1840–47 | Deputy Surveyor-General  |   |
| 1847–50 |  | Mines Surveyor and Toller of Crown Lands                  |
| 1851–52 | Geological and Mineralogical Surveyor  |   |
| 1861    |  | Inspector of Mines  |
| 1868    |  | Warden of Goldfields                                      |
| 1882    | <b>Geological Survey</b> (inaugurated 1 December 1882)   |   |
| 1889    |  | Inspector of Mines  |
| 1894    |  | <b>Department of Mines</b> (established 28 February 1894) |
| 1912    | <b>Geological Survey</b> and <b>Department of Mines</b> officially merged  |   |
| 1916    | Government Geologist appointed the Director of Mines and an Inspector of Mines   |   |
| 1917    | Government Geologist and Director of Mines appointed the official head of the department   |   |
| 1977    | Name change to <b>Department of Mines and Energy</b><br>(SADME — South Australian Department of Mines and Energy, 1977–93; MESA — Mines and Energy South Australia, 1994–97)   |   |
| 1997    | <b>Department of Mines and Energy</b> into <b>Primary Industries and Resources South Australia (PIRSA)</b><br>(October 1997; <b>Geological Survey Branch</b> now resides in <b>Division of Minerals and Energy Resources</b> ) |   |

\*The year of commencement is shown; no date of termination of office indicates that the positions were maintained continuously.

gas, coal, lime sand, and other industrial and precious minerals. The tempo of exploration quickened and more companies invested in mineral searches in the state.

The state's energy needs were again prominent in the 1970s, particularly after the oil shortages and world oil price rises in 1973–74, and the exploration, discovery and production of oil and natural gas supplies were facilitated by government support. The Geological Survey's ground-breaking seismic work in the on-going search for energy was integral to the discovery of the Cooper Basin, Australia's largest known onshore oil reserves.

The sustained efforts of geologists in the department and the private sector uncovered new deposits of uranium, including the Olympic Dam copper-uranium-gold-silver find on Roxby Downs Station in 1975, and coal.

Despite the important contribution of mineral wealth to the state's economy, in the 1980s earlier tensions over uranium had led to the department becoming less prominent in resource issues. Indeed, the Geological Survey and the department were subjected to the mantra to 'do more with less': the number of professional geologists and geophysicists on the staff fell.

## Recent initiatives and the Geological Survey today

A boost to the department came in 1992 as part of bipartisan political support for the resources sector through funded initiatives. The South Australian Exploration Initiative (SAEI) commenced in 1992 and was followed by the Targeted Exploration Initiative South Australia (TEISA), TEISA 2020 and the current Plan for Accelerating Exploration (*PACE*) which began in 2004. Until 2011 *PACE* will drive exploration initiatives and show the state as a premier destination for resource exploration, investment and mineral production.

In October 1997 the Department of Mines and Energy was integrated into Primary Industries and Resources South Australia (PIRSA) — a 'super department' formed to create opportunities for better whole-of-government operation and even more effective and unified service delivery. Within PIRSA the Geological Survey Branch remains a key part of the Division of Minerals and Energy Resources, actively contributing to *PACE* and the provision of high-quality geoscientific data to assist exploration and discovery. There are currently 58 staff in the Geological Survey, 37 of them geoscientists. The branch is organised based on teams for

mapping and exploration, geoscientific information and management, resources evaluation and planning, and contributing to the Cooperative Research Centre for Landscape Environments and Mineral Exploration (CRC LEME).

Throughout its existence, the underlying rationale for the Geological Survey of South Australia has been the belief that the principal role of government was to promote the mineral resources for the personal wealth of capital investors and for the benefit of the public at large. Development of the resources has been facilitated through recording the geology and geophysics of the state; publishing the results of investigations in maps and reports; evaluating and assessing the resources; acquiring modern geoscience data storage facilities and information retrieval systems; providing support services, and advising the government, industry and the public. The Geological Survey, importantly, has remained the best repository of geological knowledge about South Australia.

The Geological Survey serves as an exemplar of the ability of government and industry to work together to achieve their respective aspirations, on the one hand for the good of the state and its people and on the other for the benefit of the companies and their investors.

*'Geology Brown'  
(The Government Geologist)*

*A prudent tongue has Geology Brown,  
It giveth it owner never away,  
Not even to friends in the festive town  
Who see him around for a fleeting day.*

*Through far-away scrub and 'midst hills he rides  
On hardy old camel, whose footfall light  
Ne'er rouses an echo from rugged sides  
Of ranges that sleep in the glaring light.*

*No numerous train has our hero small,  
One faithful blackfellow\* follows behind  
To be at 'Geology's' beck and call,  
And share with his master the burning wind.*

*To suffer from thirst or eagerly drink  
The liquified soil that the claypans give,  
And even to stand on the seeming brink  
Of gulf which must swallow all those who live.*

*No flourish of trumpets is sounded when  
Geology Brown on a journey goes  
From pleasure-strewn haunts of his fellow-men  
To waterless wastes and to dusky foes.*

*Oh! never a sign does his face betray  
Of flattering hope or of gloomy doubt;  
He might be the Sphinx as he starts away  
To commue with rocks in the land of drought.*

*Those rocks may be mute, but they secrets tell  
To expert keen as he over them bends;  
Their various signs he has studied well,  
And has them all pat at his finger ends.*

*Yes, though he says little, please bear in mind,  
All ye who true merit would gladly crown,  
A trustier man 'twould be hard to find  
Than silent and brave Geology Brown.*

R.B.

*\* It may not be generally known that, accompanied only by a black boy, Mr Brown has made difficult and dangerous journeys which would have done credit to any explorer, and, what is certainly remarkable in 'these degenerate days', never made the slightest fuss over the matter.—R.B.*



Henry Yorke Lyell Brown

Henry Yorke Lyell Brown was born in Nova Scotia on 23 August 1844. After his education there, he attended the Royal School of Mines in London. Although he was not a university-trained geologist, in June 1865 he came to Melbourne and joined the Victorian Geological Survey in July as a field geologist under Alfred Selwyn. This survey was terminated for reasons of financial stringency in 1869. In 1870 he was appointed Government Geologist in Western Australia, where he ran the Geological Survey for two years on his own before it, too, closed in a government cutback. From 1874 he worked for 18 months in the Geological Survey of Canada (under Selwyn again) before returning to the warmer Australian climate. In May 1881 he took up a geologist's position in the New South Wales Geological Survey. In between working for these government surveys, Brown engaged in geological and mining pursuits in Australasia and Canada.

In 1882 Brown was appointed South Australia's first Government Geologist — from 1 December. His varied experiences as a geologist and miner stood him in good stead during his years in South Australia and the Northern Territory (which was then administered by South Australia). Brown's role when he began was 'simple': to survey the colony for mineral and water deposits. At first he was used haphazardly, so he established that while a proper and complete survey of the colony and the territory could not be undertaken, he would at least conduct his surveys in a thorough and scientific fashion.

Brown's passion for fieldwork not only took him on extensive surveys, including a 10-month trip to the Northern Territory, Central Australia and South Australia in 1894–95, but also served to ensure that the Geological Survey was maintained despite his absences from Adelaide. Indeed, his pioneering explorations throughout South Australia and the

*HYL Brown's services were acknowledged poetically: Robert Bruce's poem was in the Quiz on 26 July 1900; and 'The Geologist' by 'The Docket' was in the Public Service Review in 1907 and 1912.*

Northern Territory can be considered of as much importance as those of more commonly lauded explorers. He traversed much inhospitable territory on camel or by foot in the company of an Afghan camel driver, an Aboriginal guide or, occasionally, one or two white companions.

In addition to his remarkable contribution to the knowledge of South Australian and Northern Territory geology — his fieldwork was the basis of much of the subsequent geological work — Brown initiated the collecting of geological and mineral specimens to display to the public, and the exchange of publications with other organisations for acquiring more information to assist in determining South Australia's geology, and to spread knowledge of the mineral resources and geology to interested individuals. Brown's popular compilation, *Record of the mines of South Australia* (1887, 1890, 1899 and 1908), has been a standard reference book: the 1908 edition was reprinted regularly during the 20th century.

An unpretentious man and an indefatigable worker, Brown's cautious

nature assisted his impartiality and responsibilities as a government official. While speculators and companies may not have liked his frequent warnings against unwise investments, his dispassionate science prevented financial losses for companies and the public.

By 1911 Brown's duties were specified in detail: to inspect the general and specific geological features of the state; to examine and report on new mineral discoveries and districts; to advise and direct those searching for minerals and metals of economic value; to advise on and select sites for water, coal and minerals; to investigate phosphatic rock; and to investigate subterranean drainage. In addition, he was to deal with all geological and mineralogical matters in the state, and to be an honorary consultant to the federal government on government-boring work in the Northern Territory.

After retiring at the end of 1911, Brown continued his relationship with the Geological Survey by remaining as 'Honorary Consulting Geologist' until his death in January 1928. In an obituary notice, his successor, Dr Keith Ward,

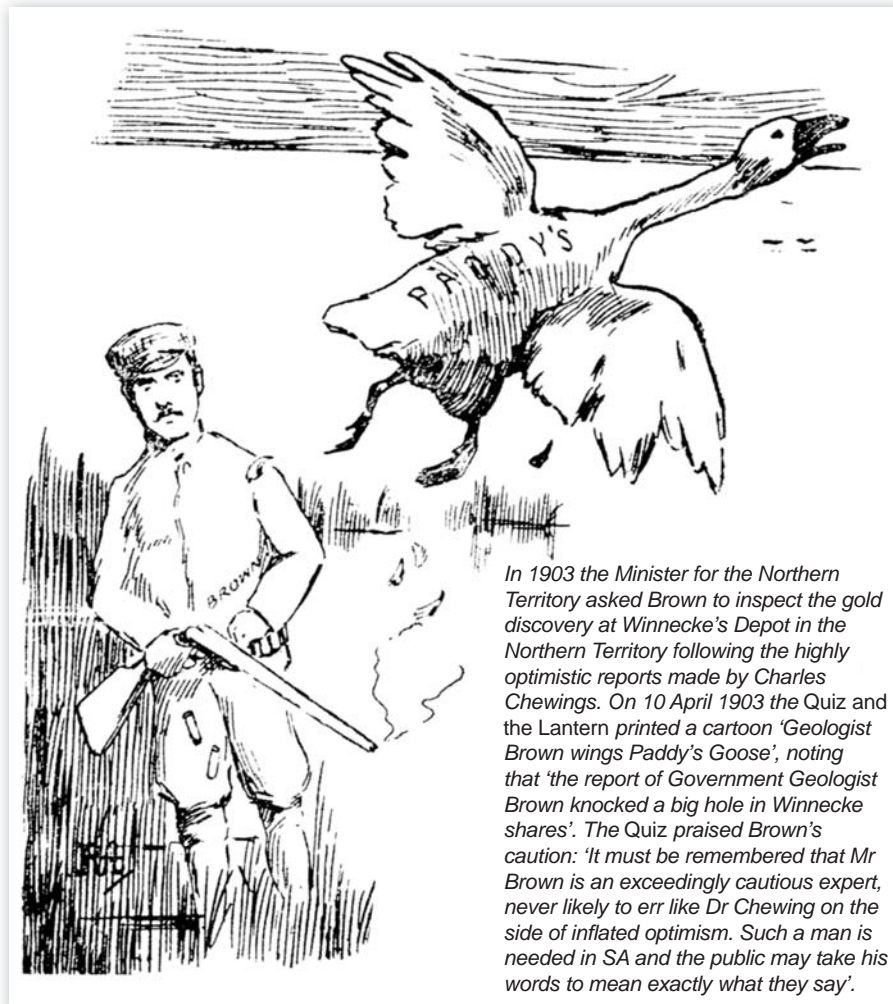


HYL Brown in about 1900. (Photo 08472)

considered that 'No single geologist has made such extensive personal contributions to the growth of our knowledge of Australian geology ... His was the heroic age of geological exploration in a great part of the continent, and his were the first geological observations placed on record with regard to many of the remote regions of the interior'.

Brown was buried at the North Road Anglican Cemetery at Nailsworth. In December 1982, in recognition of Brown's reputation and work, the headstone and surrounds of his grave were restored by the Department of Mines and Energy and a plaque commemorating the centenary of Brown's appointment as Government Geologist was unveiled.

This is the first of several articles celebrating the 125th anniversary of the Geological Survey of South Australia. Further historical information on the Geological Survey is in BJ O'Neil *In search of mineral wealth: the South Australian Geological Survey and Department of Mines and Energy to 1944* (1982), BJ O'Neil *Above and below: the South Australian Department of Mines and Energy, 1944 to 1994* (1996) and RK Johns (ed.) *History and role of government geological surveys in Australia* (1976).



In 1903 the Minister for the Northern Territory asked Brown to inspect the gold discovery at Winnecke's Depot in the Northern Territory following the highly optimistic reports made by Charles Chewings. On 10 April 1903 the Quiz and the Lantern printed a cartoon 'Geologist Brown wings Paddy's Goose', noting that 'the report of Government Geologist Brown knocked a big hole in Winnecke shares'. The Quiz praised Brown's caution: 'It must be remembered that Mr Brown is an exceedingly cautious expert, never likely to err like Dr Chewings on the side of inflated optimism. Such a man is needed in SA and the public may take his words to mean exactly what they say'.