

The Joe Lord Core Library — a valuable resource for mineral exploration

by

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Introduction

The Geological Survey of Western Australia (GSWA) focuses on the provision of high-quality pre-competitive geoscience information for the mineral and petroleum exploration industries. GSWA is principally a field-based organization producing regional geological maps and associated GIS databases. Geophysical surveys are carried out to complement this work, commonly in collaboration with Geoscience Australia, and include airborne magnetic and radiometric surveys, as well as some gravity and seismic projects.

Recent regional mapping programs have covered the granite–greenstone terranes of the Pilbara Craton, the northern part of the Southern Cross granite–greenstone terrane, and the Earahedy Basin, and current projects include the eastern margins of the Yilgarn Craton, the Capricorn Orogen, and the western Musgrave Complex. Mapping projects in the Murchison and Tanami areas are scheduled to commence in 2004–05. Geological information and associated data are now largely delivered in GIS format, as illustrated by the East Yilgarn 1:100 000 Geological Information Series, which provides seamless geological coverage for over 150 000 km² and includes outcrop geology, mineral deposit data, and available satellite and geophysical imagery. Many publications and datasets are now delivered over the internet via the Department of Industry and Resources' website at www.doir.wa.gov.au/gswa/onlinepublications.

Kalgoorlie Regional Office

The Kalgoorlie Regional Office of GSWA consists of the base for five regional mapping geologists and the Joe Lord Core Library. Mapping in the Eastern Goldfields is currently focused on the southeastern margin of the Archaean Yilgarn Craton, a little-explored area of some 15 000 km² considered to be prospective for gold mineralization. Metamorphosed sedimentary and mafic to felsic volcanic rocks occur in greenstone belts, which

occupy more than 10% of this area. The rocks have undergone several periods of Archaean deformation and additional reworking during the Proterozoic Albany–Fraser Orogeny.

Over the next few years, the mapping coverage will be extended to the northeastern limits of the Yilgarn Craton in the Yamarna area, and to the nickel-rich greenstone belts south of Southern Cross and in the Lake Johnston area. The Yamarna area is of particular interest for gold exploration following identification, in a recent deep crustal seismic survey, of structures similar to those associated with major gold deposits elsewhere in the region. Detailed mapping and structural interpretation will assist in highlighting the prospectivity of this area.

The Kalgoorlie office also provides valuable support to the exploration industry in the Eastern Goldfields. A copy of the entire database of open file statutory exploration reports is held in the office, allowing explorers to access the complete exploration history of all mineral tenements in the area.

Joe Lord Core Library

The 1997–98 Western Australian Government initiative to support the mineral and petroleum industries specifically recognized the need to commence systematic collection and curation of a representative suite of mineral exploration drillcore, and to provide facilities for industry geologists to view this material. It was also recognized that access to such a resource would encourage research that would, in turn, enhance exploration and, ultimately, improve the rate of discovery and development of the State's mineral resources. Funding was provided to construct core libraries at Kalgoorlie and Perth.

The core libraries are intended to store 2 to 5% of the 500 000 metres of core drilled each year in Western Australia, and will initially house core selected over the next ten to 15 years. They have been built with provision for expansion to house a further 15 to 30 years of collection. The success of these archival facilities relies on the selection of drillcore that is valuable, in the broadest sense, to the minerals and exploration industries. In order

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to best promote the mineral prospectivity of Western Australia, the core selected for archiving includes the following:

- significant mineral deposits;
- the range of mineral commodities, styles of mineralization, and tectonic settings;
- the geographical distribution of deposits throughout the State;
- localities that could be difficult or expensive to redrill in the future;
- excellent examples of local stratigraphy, significant structural features, or unusual geological features;
- occurrences that have provided type localities for exploration models.

Since opening in July 2000, the Joe Lord Core Library has accumulated more than 110 km of diamond drillcore. This includes 40 km of groundbreaking discovery holes, and heritage minesite holes providing physical records of deposits, such as the Golden Mile, that have been otherwise obliterated through mining. Geologists who take advantage of the facility include those embarking on new exploration ventures and those involved in research projects. It is also useful to universities and high schools for educational purposes, and companies send new staff to examine drillcore that provides fresh examples of the rock types present in their exploration areas.

The drillcore available for inspection at the Joe Lord Core Library during this field excursion is listed below.

Nickel

Kambalda (KD1) — this is the discovery hole that started the Australian nickel boom. It was drilled in December 1965 near the Red Hill gold mine to investigate the nature of sulfides below gossanous outcrops. The massive sulfide body intersected in the hole returned an assay of 8.3% nickel over 2.75 m and was later called the Lunnon shoot.

Silver Swan (SUD821) — this was drilled underground to provide a complete section through the high-grade massive sulfides at the Silver Swan mine. The drillhole was collared in footwall metamorphosed felsic volcanic rocks, and passes through the entire orebody in an area where grades are typically 14–16% Ni. The core exhibits excellent examples of typical massive sulfide textures and mineralogy.

Mount Clifford (MCD408) — this exploration drillhole provides an excellent example of the spinifex and cumulate textures in ultramafic komatiitic lavas associated with the Mount Clifford nickel sulfide mineralization. The Mount Clifford deposit, some 300 km north of Kalgoorlie, comprises several small lenses of high-grade blebby nickel sulfides.

Bulong Ni laterite — the laterite deposits at Bulong comprise over 40 million tonnes containing some 500 000 tonnes of nickel and 38 000 tonnes of cobalt. The core provides a typical profile through the deposit.

Gold

Birthday South (PRD0076) — this core provides a rare record of the Golden Mile, showing the dilational breccias and lode alteration style typical of this major gold deposit.

Binduli (CD28) — this 120 m-long drillhole at Binduli intersected the basal contact to the uppermost metaconglomerate where it overlies metamorphosed felsic epiclastic sedimentary rocks. Quartz veins with abundant gold are present between 60 and 105 m in a variety of structures.

Kanowna Belle (KDU 0058) — this is a representative section through the main host rocks to the gold mineralization at the Kanowna Belle mine, a metamorphosed fine-grained porphyritic intrusion of granodioritic composition, and the surrounding metamorphosed felsic volcanoclastic sedimentary rocks.