viz. a rock specimen, secondly a signal resulting from the leakage flux from one toroid to the other, and thirdly a common mode signal from distributed system imperfections. In the absence of specific countermeasures the latter two signals are in fact nulled by a deliberate unbalance of the bridge during the pre-measurement "zeroing" of the bridge.

(ii) Thermal stability has been improved by careful selection of the core material, though some temperature coefficient still exists. The effect of a high amplitude transient magnetic shock may in some circumstances result in the retention of a low level, slowly decaying, remanent magnetization. Facilities have therefore been provided in the electronic module for the convenient demagnetization of the cores.

(iii) Level monitoring circuits have been provided to warn of the existence of overload, which will cause erroneous measurements. Previous practice has been to monitor the detector waveform with a CRO. This is judged inconvenient and uneconomic.

(iv) Rationalization of the phase control circuits to provide the ability to read both the real and imaginary components of the unbalance voltage by simple switching.

(c) The Signal Processing Module. In general, the electronics area makes use of recent developments in solid state technology to simplify construction and enhance the performance. As stated in the previous two sections, at a number of points the internal design of the signal processing module requires special attention or involves innovations new to this type of equipment. Three points in particular will be noted in this summary:

(i) A precision input stage with high common mode rejection is used for the signal pre-amplifier. A standard (triple amplifier) differential instrumentation amplifier configuration is employed with additional reactive trimming to maximise the common mode rejection ratio at 211 Hz.

(ii) The deliberate selection of a low operating frequency greatly aggravates the problem of man-made noise. On the more sensitive ranges, power mains interference will cause gross overload unless the signal is processed by a filter before further amplification. An eighth-order, elliptical, state-variable, active filter, with maximally flat pass band and zero phase shift at centre frequency, is located in the signal path following the pre-amplifier.

(iii) The overload indicator monitors selected points at which overload can occur without the symptoms being obvious to the operator. Voltage comparators are used as bipolar limit detectors, their outputs being logically summed to control a LED indicator.

The bridge described above provides a significant improvement in accuracy and operational facilities compared to the designs which have been in use for some years. A number of additional improvements are under consideration and may be implemented during further development.

MAGNETIC AND GRAVITY INTERPRETATION ON THE STUART SHELF SOUTH AUSTRALIA

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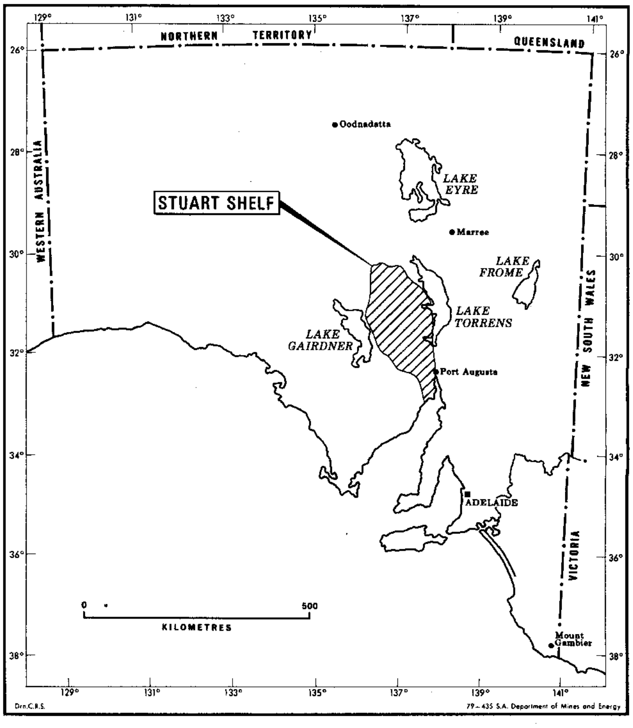
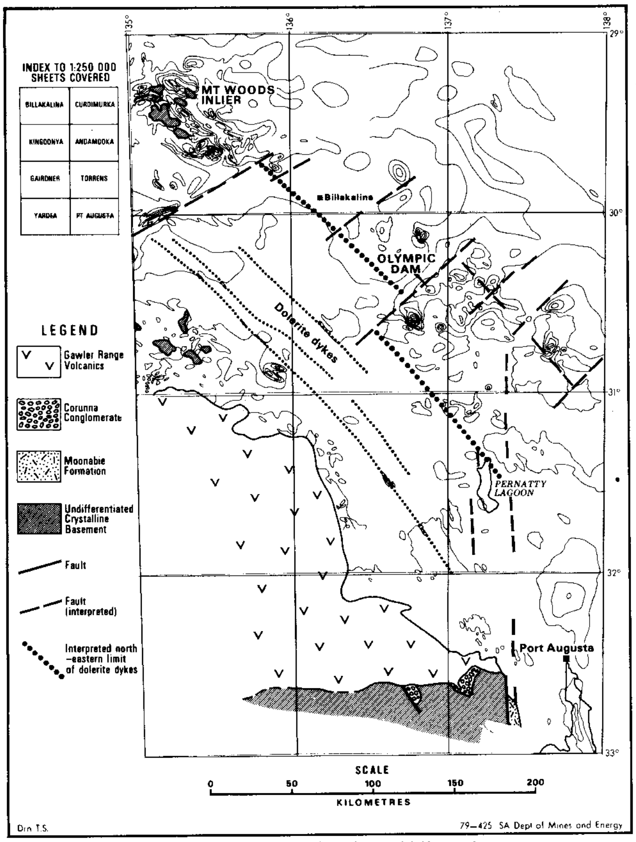
The Stuart Shelf region is a stable platform of Carpentarian or older crystalline basement which is overlain by flat lying Adelaidean and Cambrian sediments. It extends eastward from the exposed crystalline Gawler Block area to the mobile "Torrens Hinge" zone. The Olympic Dam copper-uranium deposit occurs near the eastern margin of the region in a zone of high magnetic relief which covers much of ANDAMOOKA. The deposit was discovered by reconnaissance drilling of coincident gravity and magnetic highs by Western Mining Corporation Ltd. in 1975. The mineralisation occurs beneath approximately 350 metres of Adelaidean sediments and therefore is an excellent example of the type of concealed ore body which will become a more frequent exploration target in the next decade.

Regional gravity and magnetic data in the area are widely spaced and variable in quality. Interpretation of the magnetic data indicates that the Olympic Dam deposit occurs in an upfaulted basement block, with fault movement controlled by northeast and northwest-trending fractures. Quantitative modelling indicates that the interpreted fault immediately north of the deposit may contribute directly to the magnetic anomaly observed at Olympic Dam. The northwest trend which is prominent in the regional magnetic data is attributed to dolerite dykes which are eroded feeders to the lower Adelaidean Beda Volcanics. Detailed aeromagnetic surveys from Billakalina and Pernatty Lagoon improve the resolution of these anomalies in areas where they are not as evident in the regional data. The north westerly trend is





Stuart Shelf – Regional magnetics and Pre–Adelaidean geology

also evident in the region of more intense magnetic relief which contains the Olympic Dam anomaly.

Interpretation of the depth to pre-Adelaidean basement in the region is complicated by the presence of several stratigraphically separate sources. Anomalies due to the Adelaidean Beda Volcanics and associated dolerite dykes are imposed on basement and intra-basement sources. These are distinguished on the basis of anomaly form, orientation and interpreted susceptibility values, but clear distinctions cannot always be made. The proposed regional interpretation of depth to basement does show some correlation with gravity features, but density variations within basement are also evident. Gravity interpretation is also complicated by the unknown contribution of the Cambrian Andamooka Limestone.

PETROPHYSICAL RESULTS FROM ROCKS OF THE WYALONG DISTRICT AND THEIR SIGNIFICANCE IN LOCAL MAGNETIC INTERPRETATION

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A prominent 1,000 nT aeromagnetic anomaly occurs in the south-western corner of the Forbes 1:250,000 sheet near the towns of Wyalong/West Wyalong. The anomaly lies on the western edge of an extensive meridional regional aeromagnetic feature about 50 kilometres wide, more than 300 kilometres long and several hundred nanoteslas in amplitude. On the regional BMR aeromagnetic map the Wyalong feature appears as a complex cluster of highs forming the northern termination of a linear anomaly extending well into the Cootamundra sheet to the south.

The magnetic anomaly at Wyalong is associated with a heterogeneous intermediate to basic intrusion mapped as the Bland diorite on the Forbes Metallogenic Sheet, lying on the eastern edge of the Girilambone-Wagga anticlinorial zone near the boundary of the Bogan Gate synclinorical zone. The Bland diorite, of late Ordovician age, intrudes the Ordovician phyllites and schists of the Wagga metamorphics and is in turn intruded to the west by the late Silurian Wyalong granodiorite. The gold mineralization in the area is attributed to hydrothermal activity associated with emplacement of the Wyalong granodiorite.

In order to constrain and guide geophysical interpretation and to provide data for an integrated geophysical, geochemical and petrological study of the area, a programme of outcrop sampling was undertaken. Oriented samples were collected at a number of sites within the mapped extent of the intrusion and the results of petrophysical measurements on these samples are presented in the accompanying tables. In addition to these rock types a number of hand samples of other lithologies were collected for chemical analysis, petrography, and determination of susceptibility and density. Results of measurements on these rocks are summarised below.

The Wyalong granodiorite is a foliated granitic rock of density 2.78gcm^{-3} and is non-magnetic, having susceptibility of less than 100x10^{-6} emu. The densities of the Ordovician country rock are generally around 2.75 gcm^{-3} and the susceptibilities are mostly less than 100x10^{-6} emu although samples of amphibolite had susceptibilities of 2,500x10^{-6} emu.

The heterogeneity of the dioritic intrusion is evidenced not only by the results presented in Table 1 but also by hand samples collected at a number of other localities within the intrusion. Densities range from 2.77 gcm^{-3} and susceptibilities from 100x10^{-6} emu to 2,500x10^{-6} emu throughout the intrusion reflecting compositions ranging from hornblende diorite to hornblende gabbro and norite. There may be two or