

## **ORGANIC GEOCHEMISTRY AND PETROLEUM POTENTIAL OF OUTCROP AND CORE SAMPLES OF THE PERMIAN IN THE SOUTHERN SYDNEY BASIN**

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Permian sediments occur throughout the southern Sydney Basin, exposed on the coastline south of Wollongong, and penetrated by various boreholes. This study uses outcrop samples and samples from three boreholes held by NSW Resources and Energy at the core library at Londonderry (Callala-1 from near Callala Bay, Elecom Clyde River DDH7 from near Nowra, and Elecom Clyde River DDH1 from near Wingello). Formations analysed include the Berry Siltstone, Nowra Sandstone, Wandrawandian Siltstone, the Snapper Point Formation, the Pebbley Beach Formation and the Yarrunga Coal Measures. The objectives are to determine the depositional environment, organic matter inputs, thermal maturity and petroleum generation potential of these formations, which were deposited when Australia was close to the South Pole. The rocks are thermally mature and were deposited in oxic to suboxic depositional environments. The Wandrawandian Siltstone contains biomarkers dominated by very high amounts of diahopanes and diasteranes, whereas these biomarkers are of lower relative abundance in the other formations. This is suggestive of a clay-rich sediment in an oxic, acid-catalysed depositional environment, with enhanced diagenetic alteration of the biomarkers, or alternatively an unusual organic input. The Pebbley Beach and Snapper Point formations are characterised by biomarker distributions dominated by terrestrially sourced terpanes (e.g. C<sub>24</sub> tetracyclic terpane; C<sub>19</sub> tricyclic terpane), corroborating their deltaic and shallow marine depositional environments, respectively. In contrast, the Wandrawandian Siltstone contains dominantly C<sub>21</sub>, C<sub>23</sub>, and C<sub>24</sub> tricyclic terpanes. The Pebbley Beach Formation contains high amounts of C<sub>29</sub> relative to C<sub>28</sub> and C<sub>27</sub> steranes, also consistent with a dominant terrigenous input.