Precipice Aquifer and Equivalents

METADATA

RANSLEY, T., FEITZ, A., RADKE, B., OWENS, R., RANSOM, G., BELL, J., STEWART, G.

The data referred to in this document can be obtained from Geoscience Australia at www.ga.gov.au

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Hydrogeology

Precipice Aquifer and Equivalents - Thickness and Extent

Title	Precipice Aquifer & Equivalents - Thickness and Extent
Record Id. in GA	Geocat record number: 81684
Abstract	The Precipice Aquifer & Equivalents - Thickness and Extent data sets, are part of a set that represents the hydrostratigraphic units of the Great Artesian Basin, which include five major aquifers, four intervening aquitards, and the Cenozoic cover to the GAB. There are five layers in the Precipice Aquifer and Equivalents map data A: Formation Extent B: Outcrop extent C: Isopach Raster D: Isopach Contours E: Data Point Locations The datasets have been derived from the lithostratigraphic intercepts in drillhole data from petroleum exploration wells, water bores, and stratigraphic wells. Seismic correlation and assessment of hydrogeological character based on electrofacies have not been used. The working datasest for this study has been derived primarily from the following databases: 1. PEPS-SA (Petroleum Exploration and Production System - South Australia) (Department of Primary Industries and Regions SA, 2011) 2. WaterConnect Groundwater database (Govt. of SA, 2011) 3. QPED (Queensland Petroleum exploration database) (Geological Survey of Queensland, 2010). 4. GABLOG (Great Artesian Basin Well Log Dataset) (Habermehl, 2001) 5. Additional supplementary information was derived from published reports listed in the following section. Interpretations by O'Brien & Wells, (1994); and O'Brien 2011 were used in generating the isopach data (thickness surface and contours) along the boundary of the Surat and Clarence-Moreton Basins. Isolated polygons in the North West have represent the extents of a basal Lower Jurassic sandstone underlying the Hutton Sandstone which is equivalent to the Precipice Sandstone,. This dataset and associated metadata can be obtained from www.ga.gov.au, using catalogue number 81684. Associated report reference: Ransley, T., Radke, B., Feitz, A., Kellett, J., Owens, R., Bell, J. and Stewart, G., 2014. *Hydrogeological Atlas the Great Artesian Basin*. Geoscience Australia. Canberra. [available from www.ga.gov.au using catalogue number 79790] REFERENCES: **References - main data sources** • Department of Primary Industries and Regions SA (2011). *Petroleum Exploration and Production System - South Australia (PEPS-SA).* Version 2011-06-15.

	Retrieved from http://www.pir.sa.gov.au/petroleum/access_to_data/peps-sa_database • Geological Survey of Queensland (2010). *Queensland Petroleum Exploration Data (QPED) database*. Retrieved 25 September 2011, from http://mines.industry.qld.gov.au/geoscience/geoscience-wireline-log-data.htm. • Geoscience Australia, 2013. *Mesozoic Geology of the Carpentaria and Laura Basins* (dataset). Scale 1:6000000. Geoscience Australia, Canberra. [available from www.ga.gov.au using catalogue number 75840] • Gibson, D. L., B. S. Powell & Smart, J. (1974). *Shallow stratigraphic drilling, northern Cape York Peninsula, 1973*. Record 1974/76. Australia, Bureau of Mineral Resources. • Govt. of South Australia (2011). *WaterConnect Groundwater database* [available at https://www.waterconnect.sa.gov.au]. • Habermehl, M. A. and J. E. Lau (1997). *Hydrogeology of the Great Artesian Basin Australia (Map at scale 1:2,500,000).* Canberra, Australian Geological Survey Organisation. • O'Brien, P. E. (2011). *The eastern edge of the Great Artesian Basin: relationships between the Surat and Clarence-Moreton basins*. Internal report. Canberra, Geoscience Australia. • Wells, A.T. , O'Brien, P.E. 1994 *Lithostratigraphic framework of the Clarence-Moreton Basin* IN Wells, A.T. and O'Brien, P.E. (eds.) "Geology and Petroleum Potential of the Clarence-Moreton Basin, New South Wales and Queensland" Australian Geological Survey Organisation. Bulletin 241 p4-47 **References - Seismic Surveys** • none **References - Well Completion Reports and drilling logs** • None
Lineage	SOURCE DATA: Data was obtained from a variety of sources, as listed below: 1. *WaterConnect Groundwater database (Govt. of SA, 2011)* 2. *Great Artesian Basin Well Log Dataset* (GABLOG) (Habermehl, M. A., 2001). 3. *Petroleum Exploration and Production System - South Australia (*PEPS-SA) (Department of Primary Industries and Regions SA, 2011). 4. *Queensland Petroleum Exploration Database (QPED*) (Geological Survey of Queensland, 2010). 5. Well completion and drill log reports (see references in abstract) 6. Other reports (see references in abstract) 7. Additional lithostratigraphic information from the Clarence-Moreton Basin was reinterpreted by P. O'Brien (Pers. Comm., 2011) from the earlier study of Wells & O'Brien (1994). METHOD: **Formation Extent** Extents were based on drillhole data (see References for main data sources). Extent lines were adjusted to envelop all intercepts of the Hydrostratigraphic unit. This produced some varied and irregular shapes, some patchy regions, and required some interpretation to establish the most likely extent boundary. This is a regional interpretation for mapping at approximately 1:1 000 000 to produce a broad scale overview, and examination of small areas by collecting extra data is most likely to produce results that differ from this regional interpretation. **Outcrop Extent** Outcrop extents were sourced and extracted from *Hydrogeology of the Great Artesian Basin Australia* (Habermehl & Lau, 1997) for the Eromanga and Surat sub-basins. For the

Carpentaria Basin, *Mesozoic Geology of the Carpentaria and Laura Basins* (Geoscience Australia, 2013) was used.

Isopach Raster
Source point thickness values calculated from drillhole intercepts by using the depth to top and bottom values of formations within the drillhole database attributes, and adding them together to form the isopach values for each data point across the whole aquifer/aquitard. These thickness values were extrapolated using the ESRI ANUDEM Topo-To-Raster surface modeller. Zero thickness constraints were applied at the known extent of the aquifer/aquitard, except in cases where the formation extends beyond the GAB boundary (for example the Precipice formation on the eastern side of the GAB, where the formation is quite thick and is exposed as a cliff). In these cases, constraints were not applied and the software was allowed to model a thickness right up to the GAB boundary. Resulting grids were modified using the ESRI Grid Calculator to set the minimum thickness to 0, and clipped to the aquifer/aquitard extent.

Isopach Contours
Isopach conours were calculated from the thickness grid using the ESRI Contour Tool. These were calculated at 50m intervals. In most cases the zero contour lines generated by the tool were replaced by the extent of the aquifer due to the erratic nature of the generated lines. In cases where the aquifer/aquitard is thick at the extent, the zero isoline is outside the extent and is not mapped in that area. Isopachs were clipped to the aquifer/aquitard extent.

Data Point Locations
Data Point Locations have been derived from the bore hole data collected for this project. Only the location has been included.

SOFTWARE:
All modifications/edits and geoprocessing were performed using ESRI ArcGIS 10 software.

QAQC:
Data sets were searched for errors such as negative thickness, missing data, incorrectly calculated thickness, aquifers/aquitards with missing formations, and false XY data.
The data was given a second Q&A after the thickness grids had been calculated. This involve plotting the points and the thickness grid and looking carefully for bad values. Sometimes a false outlier value would cause a 'bullseye' effect on the grid. To check the veracity, nearby data would be compared, and if necessary the original data would be searched check the value. Some petroleum fields would have wildcat picks at certain bore holes and these were compared with nearby boreholes and adjusted or deleted. Additionally, if whole subregions had suspect values the data was check to ensure the relevant data had all been included. Finally, data sets were also checked to ensure the bore whole data recorded the full thickness of the Aquifer. In many cases water bores only go down until a suitable water source is found and often will not penetrate the whole aquifer. This data was considered on a case by case basis, in areas where plenty of suitable data was available they were removed, and in areas of sparse borehole data they were included to establish the occurrence of the formation albeit as a minimum thickness value.

Data has undergone a QAQC verification process in order to capture and repair attribute and geometric errors.

Use Limitations	These datasets have been compiled or interpreted from existing and new data sets that vary in scale. They are intended to be used for broad, regional understanding of the basin and are not designed to be used at a local scale. Where existing data sets have been used we have attempted to correct any errors, however errors may remain. It has to be stressed that this generalised basin-wide concept is scale dependant, and may exaggerate the distinction between the superposed aquitards and aquifers. Although this hydrostratigraphy offers more accessible comprehension of the regional hydroarchitecture, the generalisation comes with the inherent dangers of simplification and apparent enhanced contrast of a complex system. For local hydrogeological study, such generalisations may not necessarily survive closer scrutiny.
Extent	
Scale	1:9,000,000
Projection	Lambert conformal conic GDA 1994, with central meridian 134 degrees longitude, standard parallels at -18 and -36 degrees latitude.