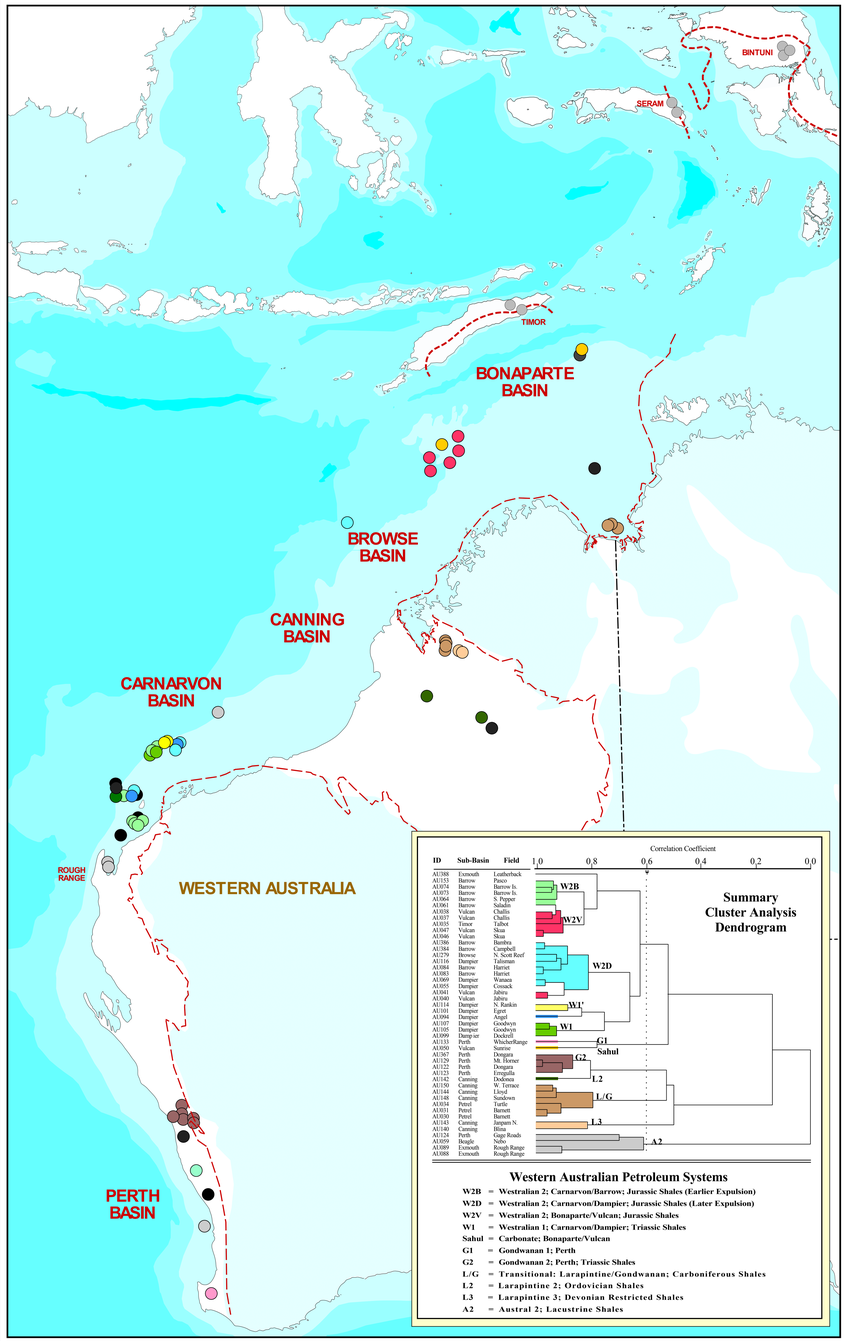


Summary Cluster Analysis Dendrogram

Western Australian Petroleum Systems

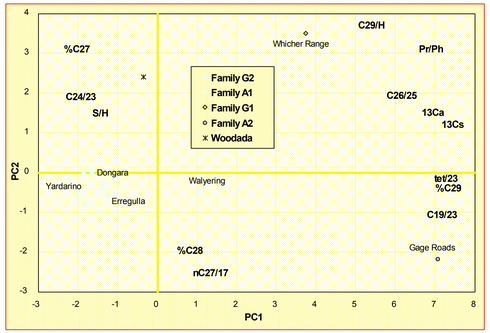
- W2B = Westralian 2; Carnarvon/Barrow; Jurassic Shales (Earlier Expulsion)
- W2D = Westralian 2; Carnarvon/Dampier; Jurassic Shales (Later Expulsion)
- W2V = Westralian 2; Bonaparte/Vulcan; Jurassic Shales
- W1 = Westralian 1; Carnarvon/Dampier; Triassic Shales
- Sahul = Carbonate; Bonaparte/Vulcan
- G1 = Gondwanan 1; Perth
- G2 = Gondwanan 2; Perth; Triassic Shales
- L/G = Transitional: Larapintine/Gondwanan; Carboniferous Shales
- L2 = Larapintine 2; Ordovician Shales
- L3 = Larapintine 3; Devonian Restricted Shales
- A2 = Austral 2; Lacustrine Shales

Summary Table

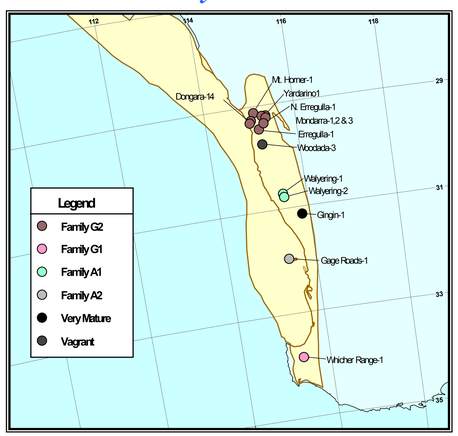
	Field/Well	Depth (m)	PC 1	PC 2	PC 3	13Cs	13Ca	S1/S6	Ts/Tm	29D/H
Family G2										
AU130	N. Erregulla	2930	-1.40	-0.42	0.06	-32.38	-31.15	0.90	1.46	0.36
AU123	Erregulla	3181	-1.24	-0.56	0.31	-32.31	-31.10	0.79	1.47	0.38
AU129	Mt. Horner	1490	-1.85	-0.04	0.00	-32.68	-31.27	1.08	1.88	0.65
AU122	Dongara	1646	-1.65	0.00	0.13	-32.48	-30.97	1.22	2.50	0.55
AU367	Dongara	1753	-1.35	-0.26	0.02	-32.66	-30.95	1.07	2.55	0.69
AU135	Yardarino	2323	-2.24	-0.20	1.16	-32.57	-29.84	2.46	2.64	0.96
AU137	Yardarino	2323	-1.81	-0.81	0.42	-32.57	-29.76	2.15	3.00	1.08
AU136	Yardarino	2323	-1.97	-0.51	0.37	-32.39	-29.52	2.07	3.67	1.17
AU126*	Mondarra	2700				-31.77	-27.90			
AU127*	Mondarra	2740				-32.48	-29.64			
AU128*	Mondarra	2845				-32.52	-29.24			
AU368*	Dongara	1691				-31.49	-28.08			
Family A1										
AU131	Walyering	3399	1.03	-0.49	-1.27	-27.91	-24.83	1.46	1.08	0.23
AU132	Walyering	3997	2.04	-0.43	-3.36	-27.93	-24.77	3.33	1.83	0.67
Family G1										
AU133	Whicher Range	4205	3.74	3.49	0.59	-26.10	-24.75	1.17	1.33	0.30
Family A2										
AU124	Gage Roads	1782	7.06	-2.19	1.52	-24.52	-23.82	1.30	0.37	0.19
Vagrants										
AU125*	Gingin	3879				-25.53	-24.10			
AU134	Woodada	2500	-0.36	2.41	0.06	-30.58	-27.37	2.53	3.58	0.89

*very low/no biomarkers (condensates)

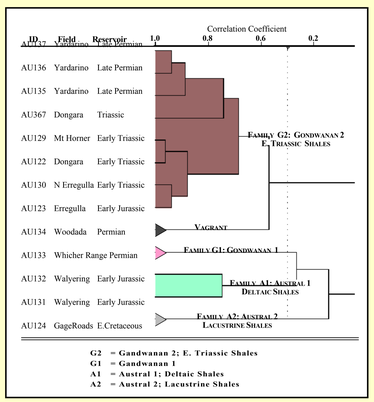
Principal Component Scores and Loads



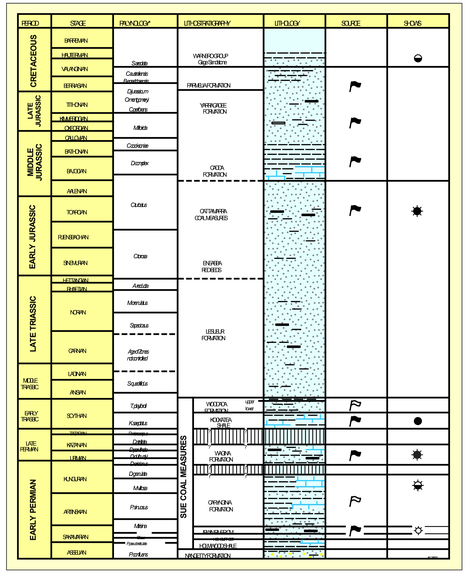
Oil Family Distribution



Cluster Analysis Dendrogram



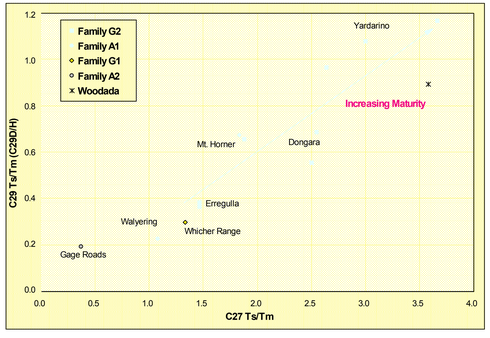
Stratigraphic Chart



Abstract

The largest group of Perth Basin oils (from Yardarino, Dongara, Erregulla, and Mt. Horner fields) also show the strongest geographical association in their distribution around the Dongara Saddle. These oils have their source in the Early Triassic Kockatea shales of the Gondwanan (G2) petroleum system. The most distinctive characteristic of these oils is an extremely light carbon isotopic signature. The source rock is exceptionally rich at its base. However, the thinness of this facies limits the volume of hydrocarbons that could have been generated and expelled. Walyering and Gingin condensates represent the Austral (A1) petroleum system sourced by deltaic shales while the Gage Roads-1 oil represents the A2 system with a lacustrine shale source. The volumetric extent of these sources limits the amount of hydrocarbons that could have been generated in this region, and this appears to be the major exploration risk in the basin. The Whicher Range-1 condensate is the sole representative of the Gondwanan 1 petroleum system in the Perth basin. It has the distinctive heavy carbon isotope signature of Permian petroleum and has affinities to the Petrel-4 (Petrel Sub-basin) and possibly the West Tryal Rocks and Barrow Deep (Carnarvon Basin) condensates. Woodada is a vagrant perhaps due to its high maturity and may be related to Family G2. As illustrated in the **Terpane Maturity** plot for Perth Basin oils, within Family G2, Yardarino oils are clearly more mature than Dongara and Mt. Horner oils. Erregulla oils are the least mature members of Family G2. The two Walyering oils have experienced different degrees of thermal stress related to reservoir depth. The more mature Walyering-2 sample came from 3997m while the Walyering-1 oil was reservoired at 3399m.

Terpane Thermal Maturity



GeoMark Research, Inc.

AGSO Australian Geological Survey Organisation

Petroleum Systems of Western Australia

Perth Basin Montage

March 1996