PANEL 4: THE FAMOUS AND THE INFAMOUS

First Reef Drilled: Meda-1

- Wapet drilled Meda-1 in 1958 to test a gravity and seismic anomaly on the Lennard Shelf. In this early work, gravity highs were interpreted as subsurface basement highs likely to be associated with reef complexes.
- Figure 4.1 shows Wapet's seismic picks from a single-fold line across the Meda gravity anomaly, highlighting the interpreted reef facies at the Meda-1 and –2 locations.
- The technical success of the well is a testament to the interpreters of the day. Meda-1 (though initially difficult to relate to the outcrop model) penetrated Fammenian Nullara backreef facies (Wapet's Unit B) overlying Frasnian fore-reef and platform facies (Unit C) (Kerans, 1985).
- Free oil was recovered from the Carboniferous laurel Formation and gas shows were observed in the Devonian sequence. A follow-up Meda-2 was unsuccessful.
- WAPET's early exploration was frustrated by poor quality seismic and other factors which made it difficult to identify or predict the reef system geometry in the subsurface. At Langoora-1, for instance, drilled to test a reef development above a basement high, the mapped Permo-Carboniferous thinning interpreted as a drape feature, proved to be a velocity effect created by high-velocity shales infilling a Permian channel. There was no reef section present. The Langoora high can be seen on the 1967 Line AH on Figure 4.1

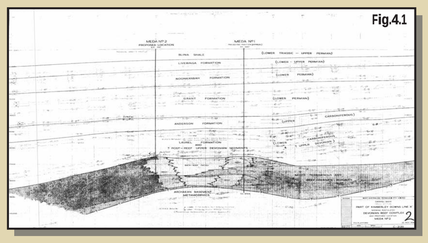
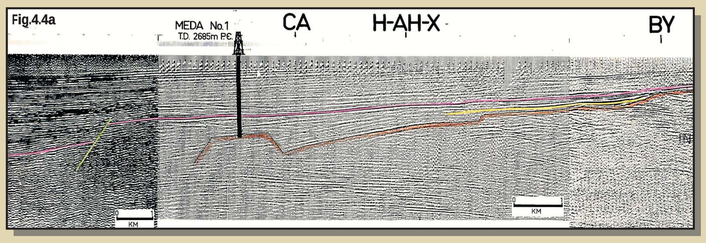
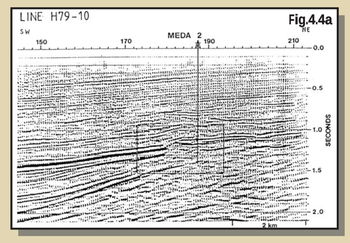
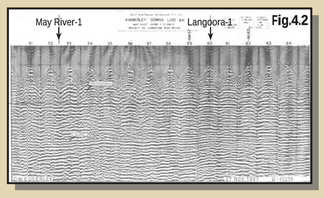


Fig.4.1

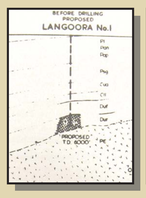


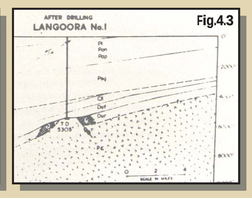


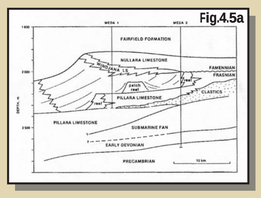


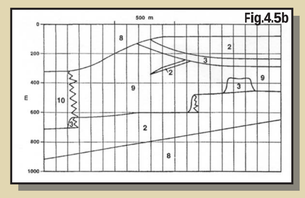
- Data quality improved through the 1960s with the introduction of CDP stacking and digital acquisition and processing, but WAPET was still unable to image the reef in the subsurface on the Lennard Shelf. Neither reef not basement are reliably imaged on Figure 4.4a, a reprocessed 1960s line through Meda
- This led WAPET to focus on possible stratigraphic traps where the reef pinched out on basement or where facies changed. Their late 1960s North Meda stratigraphic play is shown in Yellow on Figure 4.4a
- Subsequent seismic in the area by Home Oil was of much better quality and showed how insightful that 1958 interpretation had been (Figure 4.4b).

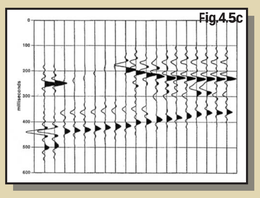
- The better-quality Home Oil data recorded over Meda in 1979-80 allows a reasonable correlation of the seismic data to the details of the reef interpretation.
- Kerans(1985) interpreted the Meda anomaly in terms of a Pillara platform and patch reef complex, overlain by Frasnian fore-reef sediments and then the Fammenian reef system, as shown on Figure 4.5 (a).
- Middleton (1987) stylized this model, as shown on Figure 5.5 (b) and generated a synthetic section (Figure 4.5 (c))on which the detailed interpretation at Meda was based.

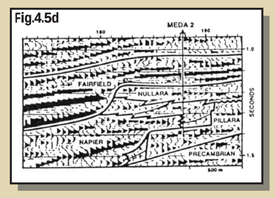








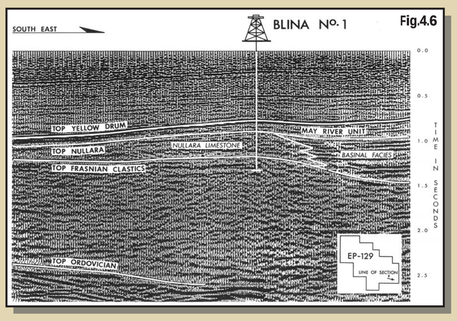


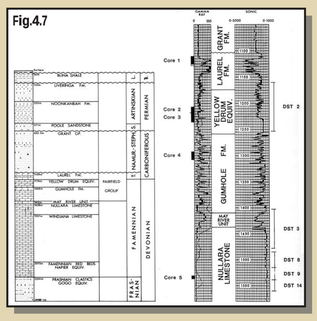


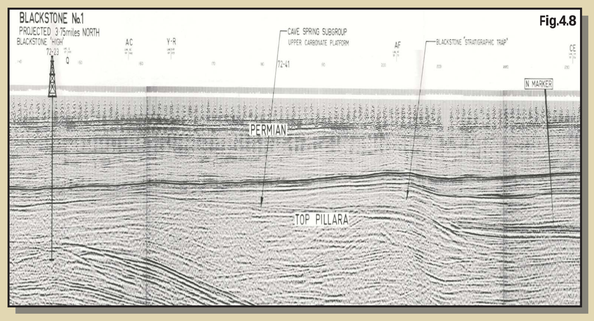
First & Only - Producing Reef: Blina-1

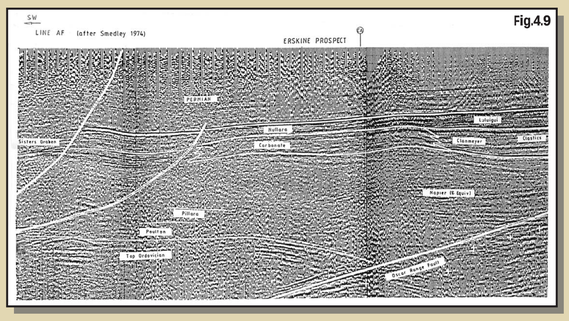
- Blina-1 was drilled by Home Energy in EP 129 in 1981 to test a seismically-defined closure near the edge of the Lennard Shelf (Figure 1.3), with the primary objective a Fammenian reef where dolomitized Winjana Limestone was expected. The overlying latest Devonian Yellow Drum Fm was a secondary objective.
- Blina-1 tested 905 bbl/d of from back-reef Nullara Limestone and 37 bbl/d of 37o API oil from the carbonate mudstones in the Yellow Drum Fm (Figure 4.6).

- The Blina reef anomaly was first recognized by WAPET in the early 1970s as a stratigraphic trap on the flank of the Blackstone High, as shown on Figure 4.7
- WAPET subsequently designated this as the Erskine Prospect, as shown on Figure 4.8, and drilling of this Fammenian reef complex was recommended, but never done.
- Home Oil and partners, drawn together partly by geophysicist Al Sabitay, initially focussed on WAPET's North Meda Prospect (Figure 4.4a) in their evaluation of EP 129, but quickly shifted attention to the Erskine feature, which they relabelled Blina, after seismic in 1979 and 1980 showed the details of this interesting reef anomaly





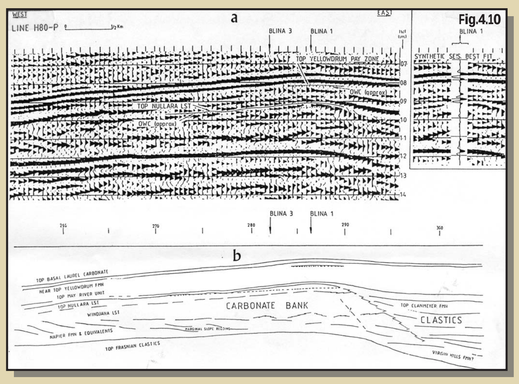


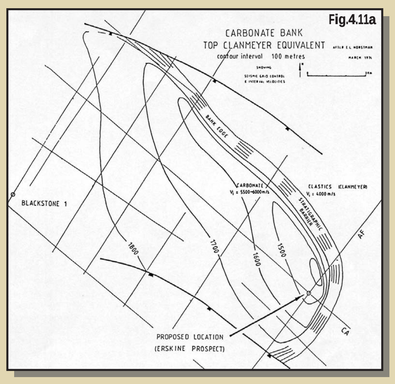


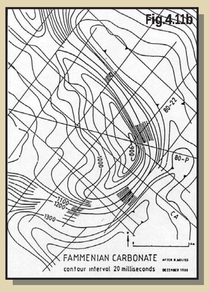
- This geoseismic interpretation of line H80-P on Figure 4.10, taken from Del Taylor's (1980) paper, shows Blina as a tilted carbonate bank, with a steep eastern flank where there is facies change to the basinal Clanmeyer Formation clastics.
- Production occurs from the crest of the 'reef', and the accumulation is controlled by the structural closure.
- The draping Yellow Drum Fm is also shown, with the very small structurally controlled closure at the crest.

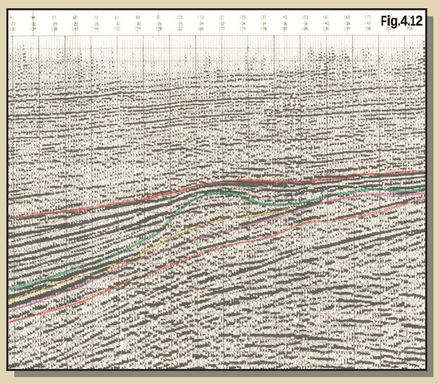
- The Blina discovery was a point of enthusiasm by some and irritation for others. Some, such as Phil Playford (1981) saw it as a pointer to discoveries to come and likely to attract other explorers; others, such as Whitestone's Bud Stilley, saw the small reserves as discrediting the potential of the Devonian reef play, making it harder, not easier, to attract capital and farm-in interest.
- The anomaly was originally seen on WAPET mapping (Figure 4.11a) to have potential reserves of over 100 MMbbls.
- As Home Oil acquired more and more seismic, however, the field became smaller and smaller, as the maps on Figure 4.11 show. These four maps are from 1972 (a), 1981 (b), 1984 (c) and 1987 (d), and show a progressive shrinking of the field.
- When Home Oil floated on the Australian Stock Exchange in 1981 the 2P reserves were quoted as 2.2 MMbbl, a 50-fold decrease from pre-drill estimates; by the time Blina-4 was completed in 1982, reserves estimates were only 1.1 MMbbl.
- Blina may have been the first discovery in a Devonian reef in the Canning basin, but it wasn't the discovery explorers were then all confidently anticipating.

- The EP 129 venture drilled numerous other wells in the permits but without further success and with many surprises.
- Some wells, like Yarrada-1 (Figure 4.12) targeted the Fammenian reef trend but, while successful in penetrating the reef, encountered neither shows nor porosity, and had unpredicted sediments above (Yellow Drum eroded) and below (Frasnian alluvial fan).
- Other wells' such as Orange Pool-1 proved to be erosional basement knobs, showing that the problems of predicting reef presence that had plagued Wapet in the 1960s were still an issue for 1980s explorers.



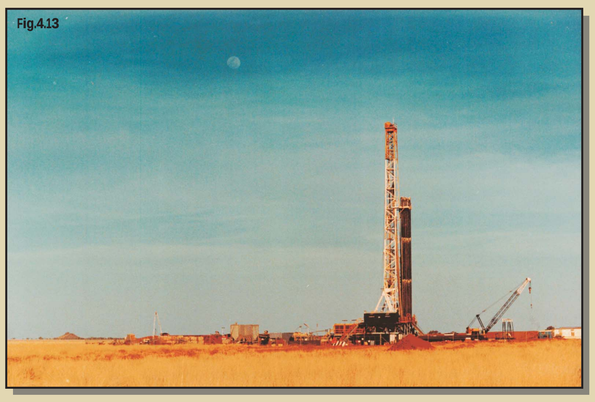


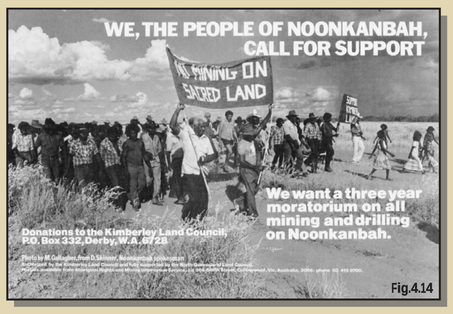


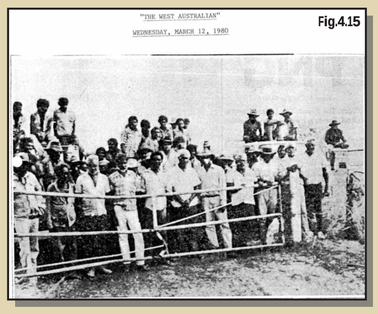


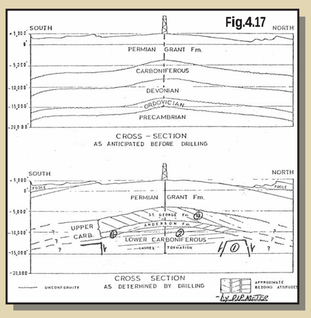
The Infamous Noonkanbah Well: Fitzroy River-1

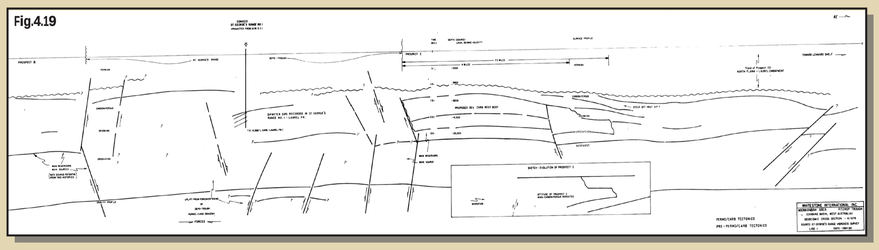
- The most controversial 'reef' test in the Canning basin was Amax's Fitzroy River-1 in 1980 on Noonkanbah Station in the Fitzroy Valley. The rig is shown on location on Figure 4.13, with P Hill, on the far left horizon.
- An Aboriginal group, newly-settled back on Noonkanbah Station which the WA Government had purchased for them, became concerned about increased mineral and oil exploration on the station and damage to their 'sacred' sites.
- In 1979 the fledgling Kimberley Land Council and others exploited this natural xenophobia to orchestrate full-scale opposition to the proposed Amax well, claiming that P Hill was a site sacred to 'goanna dreaming'. The sphere of sacredness said to surround the hill had to expand several times to keep covering the well site, which was finally 3.6 km away.
- The well was postponed until 1980, at which time the WA Government, determined to oppose Land Rights, took over the drilling project, moved the rig onto the station and spudded the well.

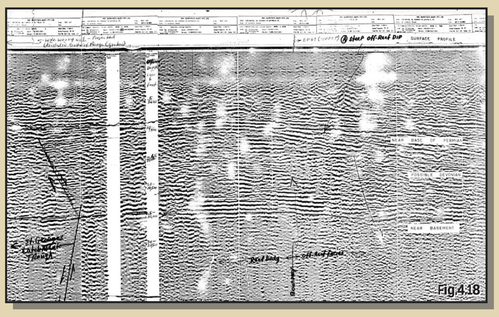












- Whitestone's 1976 seismic seemed to confirm Stilley's concept: a basement like reflection was overlain by seismic dips that could be interpreted as reefing.
- Many geophysicists from many companies worked on that 1976 dataset and all interpreted Devonian reefs. These reefs were at different places, associated with different seismic anomalies, and of different ages, as shown on Figure 4.20, but no-one initially questioned the presence of a palaeohigh block with Devonian reefing. (Line locations on Figure 4.21, with Stilley annotations).
- A 1978 seismic tie to Mt Hardman-1 showed that the Devonian was deeper than initially thought. Stilley re-interpreted his upper reef anomaly as Carboniferous Laurel clastics but he and Amaax retained their Frasnian reef interpretation.
- In an ironic twist, that seismic line led the writer to oppose the drilling of the Noonkanbah well on the grounds that it would never reach the Devonian!

- The exploration concept at Noonkanbah was developed by Whitestone's Exploration Vice President, Bud Stilley, during work with Conoco on the St George Range-1 (SGR) well in the late 1960s.
- Stilley had recorded a seismic line across the large SGR anticline, and saw what he considered clear evidence that the structure was an inverted graben. He argued that SGR-1 would never reach the Devonian objectives and that the place to drill for reefs was on the flanking palaeohigh blocks. Conoco proceeded with the well which Stilley thereafter always called Wye Worry-1. As he has predicted, the well never reached the Devonian section.
- Stilley's cartoon of the palaeohigh blocks flanking St Georges Range-1 is shown on Figure 4.17. His line drawing of Conoco Line 1, drawn in 1976 after Whitestone was granted EP 97 over the area, is shown on Figure 4.18. The portion of Line 1 across the Noonkanbah structure is shown on Figure 4.19.