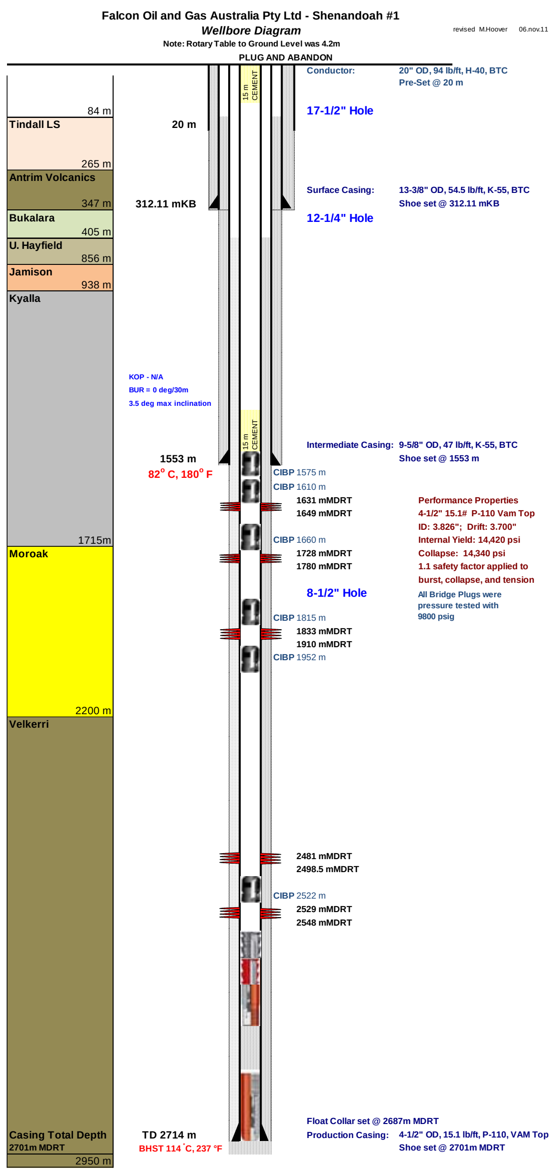
4.0 PLUG AND ABANDONMENT

The Shenandoah-1A was plugged and abandoned (P&A) on 7 November, 2011. Each tested interval is isolated with a cast iron bridge plug (CIBP). On top of the shallowest CIBP a 15m long cement plug was set, which was followed by another 15m long surface cement plug (Figure 4.A).

Correspondence between Falcon Oil and Gas Australia and the Department of Resources, NT regarding P&A request and approval is included in Appendix II of this report.

Figure 4.A Plug and Abandonment schematic of Shenandoah 1A



5.0 ENVIRONMENTAL

Falcon Oil and Gas is sensitive to the value of the natural environment and is committed to minimizing the effects its operations have on the surrounding environment. Well site footprints are limited in size and restored to limit the impact of the natural process to establish the natural conditions. The protection of ground water aquifers from any contamination caused by the drilling, completion, stimulation or production activities is of paramount concern.

AECOM Australia Pty Ltd, a world leading environmental consultancy was chosen to develop and monitor the re-entry drilling and testing of the Shenandoah-1A. The AECOM, Drilling Environmental Plan 2011-2012 (Appendix I) is included in this report.

AECOM was also chosen to monitor water ground water quality around the Shenandoah-1A operations. The following is the AECOM Groundwater Sampling Method.

AECOM

Shenandoah #1 Completion
Falcon Groundwater Sampling Method

1

Groundwater Sampling Method – Production Bore

The following sampling method serves as a step by step guide for collecting groundwater samples from the production bores.

Appendix A provides the list of the analytes required for sampling, the correct sample bottles and the required holding times. Appendix B provides the field datasheet to be compiled for each bore and Appendix C provides the Chain of Custody (COC) required for tracking of the samples between sampling, dispatching of samples to the laboratory and the laboratory receiving the samples.

1.1 Sample method

1.1.1 Purging production bore

The method required to purge the bore prior to sampling is as follows:

- If the bore is pumped only occasionally, turn on the pump and run it for the amount of time you calculate is necessary to remove three to four casing volumes and when water becomes clearer (or until pH, EC and temperature readings stabilise if field multi-parameter probe is available).
- If bore is used for continuous pumping at certain times of the day (e.g. irrigation, town water supply) there is no need to purge – simply be prepared to sample when the bore is used.

1.1.2 Prior to collecting samples

Prior to collecting samples the following should be undertaken:

1) Label all of the intended sample bottles, including the duplicate and trip blanks bottles.
2) Labels should including client, sampled by, sample identification and date/time. Note sample id and date and time are important to track the sample.
3) A waterproof marker pen or pencil should be used for all labelling and all labels must be clearly written.

Bottles should be labelled as follows:

2) Sterilise the tap (if metal) for one minute with the flame from a gas burner/cigarette lighter. Note only heat the mouth of the tap as excessive heating can damage the tap. **Do not heat if sampling from a hose**.

3) Ensure three volumes of water have been purged from the bore prior to collecting the primary sample. Note the duplicate sample should be collected from the first bore during the monitoring program.

4) Collect the sample from the discharge point directly into the provided sample bottles. Do not allow the bottle or your hands touch the tap. VOC samples should be collected first:

   a) Water samples to be tested for VOCs will be placed in 2 x 40 mL vials with Sodium Bisulfate with zero headspace.

   b) Water samples to be tested for total metal analysis will be placed in 1 x 250 ml metal bottle. The box on the bottle label should be ticked (✓) for **Total**.

   c) Water samples to be tested for dissolved metal analysis will require field filtering prior to filling 1 x 250 ml metal bottle. Collect sample initially in a green bottle and filter using a 0.45μm pore size filter into the metal sample bottle. The box on the bottle label should be ticked (✓) for **Dissolved (field filtered)**.

   d) Water samples to be tested for microbiological analysis have only a 24 hour holding time. As such, it is important to ensure sampling occurs at a time to ensure the microbiological samples can be delivered back to Darwin and processed within 24 hours.

5) Once the bottles are filled, replace the lid minimising the amount of air trapped inside the sample bottle (i.e. squeeze the plastic bottles to have no air space prior to closing lid. It should be noted that some bottles have a preservative within them; the preservative is to remain within the sample bottle and should not be emptied out. Care should be taken to minimise overfilling bottles, resulting in a loss of the preservative.

6) Once collected, place all samples into an esky with the frozen ice blocks. The trip blank should remain in the esky the entire time. If two eskies are required, you would need one trip blank in each esky.

7) Fill in a field datasheet (Appendix B) for each monitoring bore and sign the COC (Appendix C) and return with the esky to the AECOM Darwin office for preparation and dispatch to the analysing laboratories.

1.1.5 Sample storage in transit

Ensure that all samples are to be packed into an esky with frozen ice blocks to keep the temperature at or below 4°C. Note some sample bottles are glass and care should be taken to ensure packaged to minimise breakage on transit.

- Primary Samples (four samples):
  - Registered Bores – **RN028303**, **RN035538**
  - To be registered bores(i.e. newly installed bores) – **SHEN01**, **SHEN02**
- Duplicate Sample – **DUP01**
- Triplicate Sample – **Trip1**, **Trip2** etc.

1.1.3 Quality Assurance/Quality Control (QA/QC) requirements

The QA/QC requirements for the monitoring program include:

- Primary sample – this refers to the primary sample taken from each of the bores.
- Duplicate sample – this refers to the taking of a second identical sample at one of the wells during the sampling program. The sampling procedure, storage, handling and analysis for the duplicate sample should be identical to those methods used for the primary sample.

  The duplicate sample bottles should be labelled **DUP1**. This sample is to be taken from one of the bores during the sampling program and recorded on the field datasheet provided in Appendix B.

  Please note that no reference should be placed on the bottle or COC to where this sample was collected from.
- Trip blanks – this refers to bottles filled with a sample of blank solution or rinsate which are sent out by the laboratory. Do not open these, trip blanks are to remain sealed and should accompany the other samples at all times.

1.1.4 Collecting samples

The method to collect samples is as follows:

1) Ensure the sample point has been wiped down with a clean cloth to remove any dirt from the outlet/discharge hose.

Documentation of the various AECOM periodic reports and certificates of analysis are included in Appendix XIII of this report. To date there are no indications that the Shenandoah-1A drilling, re-entry, stimulation or water reinjection has impacted the ground water in any way.

6.0 CONCLUSIONS

The drilling and testing of the Shenandoah-1A has advanced the understanding of the geologic model of the Beetaloo Basin and demonstrated the viability of the Proterozoic Kyalla and Velkerri petroleum systems.

The Shenandoah-1 well was placed to penetrate the formations at the deepest location within the center of the Beetaloo Basin and as a twin to the Pacific Oil and Gas, Balmain-1 well drilled in 1992. The Balmain-1 well recorded oil fluorescence shows over the Hayfield Sandstone and Upper Kyalla Formations with TD @ 1050 m. The Shenandoah-1 also recorded oil shows over the Hayfield Sandstone and Upper Kyalla Formations and was drilled deeper into the basin where casing was set at 1553 m. Mud gas increased substantially in the Shenandoah-1 while drilling through the Mid Kyalla Sandstone @ 1463 m and continued into the Lower Kyalla to TD.

The Pacific Oil and Gas well, Jamison-1, drilled in 1990-1991, was located ~20 km to the south east of Shenandoah-1. It also recorded oil shows similar to the Shenandoah-1 and Balmain-1 wells over the Hayfield and Upper Kyalla and was drilled deeper through the Lower Kyalla and reached TD @ 1765 m within the Upper Moroak Sandstone. Jamison-1 mud gas shows were recorded continuously throughout the Kyalla and increased markedly over the Lower Kyalla from 1560-1670 m.

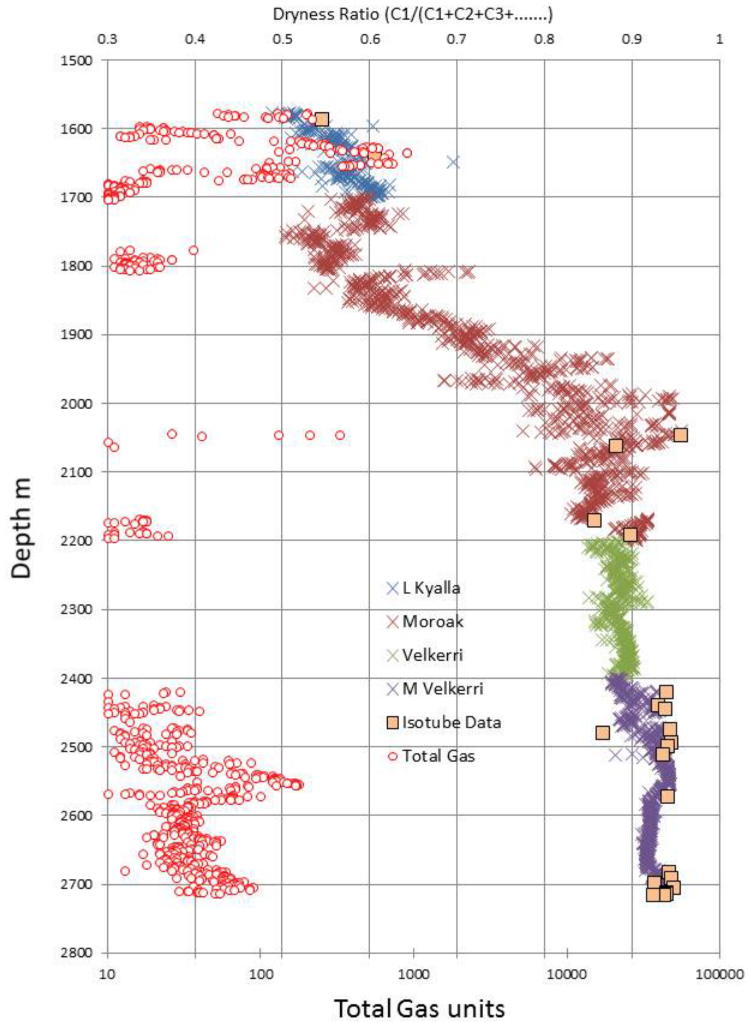
The Shenandoah-1A commenced drilling from 1553 m in August 2009 reaching a total depth of 2714 m in October 2009. Similar to the Jamison-,1 well, mud gas shows on the Shenandoah-1A were immediately recorded while drilling into the Lower Kyalla with a significant increase from 1615-1675 m where total gas reached ~ 11%.

Shenandoah-1A mud gas decreased in the Upper Moroak Sandstone with a substantial drop @ 1806 m. Mud gas remained relatively low throughout the Moroak Formation and Upper Velkerri with an increase recorded over the Middle Velkerri section below 2410 m and a substantial increase over the Middle Velkerri Lower B from 2518-2558 m.

Figure 6.A is a plot of the Shenandoah-1A mud gas dryness ratio vs. depth including gas dryness ratio from the isotube data collected during the drilling of the well. There is good agreement between the mud gas and drilling isotube ratios as well as the gas ratios collected during the Velkerri and Lower Kyalla well tests.

The gas dryness ratios indicate that the Lower Kyalla gas has more heavy components than the Middle Velkerri gas. These data support the thermal maturity interpretation that for depths greater than ~1700 m in the Beetaloo Basin, dry gas is the prevalent hydrocarbon fluid type. Source rocks shallower than ~1700 m are most likely in the oil window of thermal maturity.

<u>Figure 6.A Shenandoah-1A: Mud Gas Dryness Ratio</u>



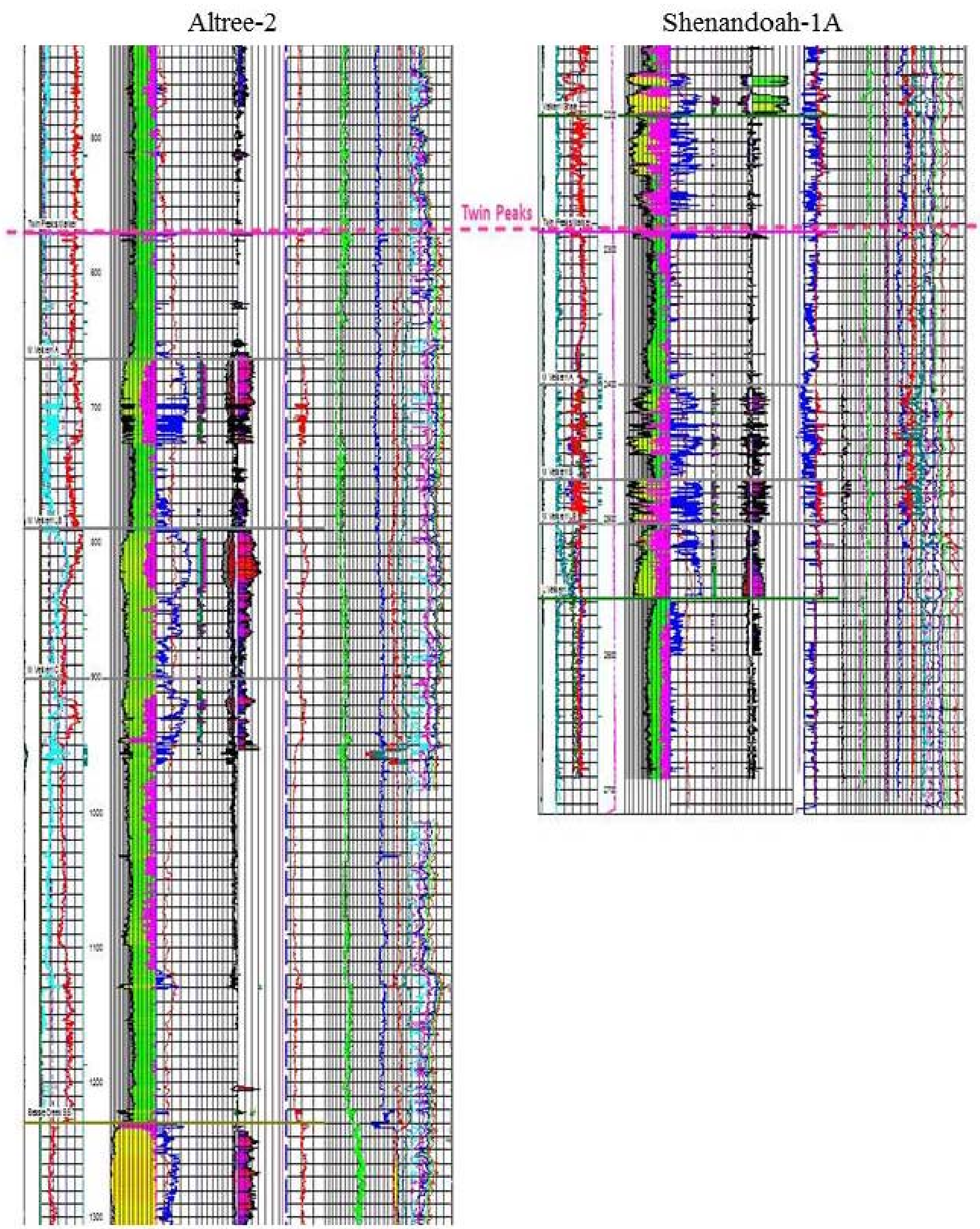
The penetration of the Velkerri formation in the Shenandoah-1A is the first evidence of the distribution of the Velkerri Formation southward into the Beetaloo Basin. Prior to the drilling of the Shenandoah-1A, the Velkerri Formation was documented in the Pacific Oil and Gas wells, Altree-2, Walton-2 and McManus-1 wells ~100 km to the north. Cores over the Middle Velkerri from the three Pacific Oil and Gas wells are described as “Bleeding Oil and Gas”.

Figure 6.B shows the correlation of the Velkerri that was achievable by recognizing the “Twin Peaks” marker bed present in the Altree-2 and Shenandoah-1A wells. At the Altree-2 location the Middle Velkerri A, B and C are organic rich source rocks with TOC up to 6-8%. Thermal maturity estimations place the relatively shallow Middle Velkerri source rocks in the oil window at the Altree-2 location. The Middle Velkerri C source rock identified in the Altree-2 well is interpreted as not present at the Shenandoah-1A location.

At the Shenandoah-1A location the Middle Velkerri A and B zones contain low porosity gas sands with little if any organic matter identified. The Middle Velkerri Lower B (Stage 1 well test) has 2% TOC and is the most likely the source for gas tested in the Middle Velkerri B (Stage 2 well test).

It is not surprising that the lithofacies of the Velkerri formation varies over the 100 km distance between the Altree-2 and Shenandoah-1A. It is also recognized that the correlations from these two wells may be changed with additional drilling within the Beetaloo Basin.

Figure 6.B Stratigraphic correlation: Altree-2 to Shenandoah-1A



The Shenandoah-1A, Stage 3 and 4 well tests in the Moroak Sandstone were in intervals that have very low porosity and permeability. There are other intervals within the Moroak Formation identified from log analysis that have higher porosity and, most likely, higher permeability. These intervals were not tested due to the lack of mud log shows and the log analysis indication that the more porous sands were water saturated. The Moroak Formation is a good candidate for conventional hydrocarbon accumulations due to the viability of the Lower Kyalla and Velkerri petroleum systems.

The Shenandoah-1A, stimulation and short well tests (Stage 1, 2 &5) over the Middle Velkerri and Lower Kyalla demonstrated that these formations can be hydraulically fractured, the reservoirs are over pressured, all three reservoirs contain producible hydrocarbons and may have enough permeability to be candidates for horizontal well tests. Given successful horizontal long term tests, the pervasive regional extent of both the Middle Velkerri and Lower Kyalla in the Beetaloo Basin will offer excellent targets for future development.