

**SANTOS – TAMBORAN RESOURCES**

**COMPILED FOR**

**SANTOS LIMITED**

*(A.B.N. 80 007 550 923)*

**TANUMBIRINI 2H / TANUMBIRINI 2H ST1**

**BASIC WELL COMPLETION REPORT**

**EP 161 / NORTHERN TERRITORY**

**PREPARED BY:  
Benjamin Mills  
(Consultant)  
September 2021**

# TANUMBIRINI 2H / TANUMBIRINI 2H ST1 BASIC WELL COMPLETION REPORT

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## 1 Introduction and Summary

Tanumbirini 2H / Tanumbirini 2H ST1 was drilled by the Easternwell 106 rig in permit EP 161 onshore Northern Territory.

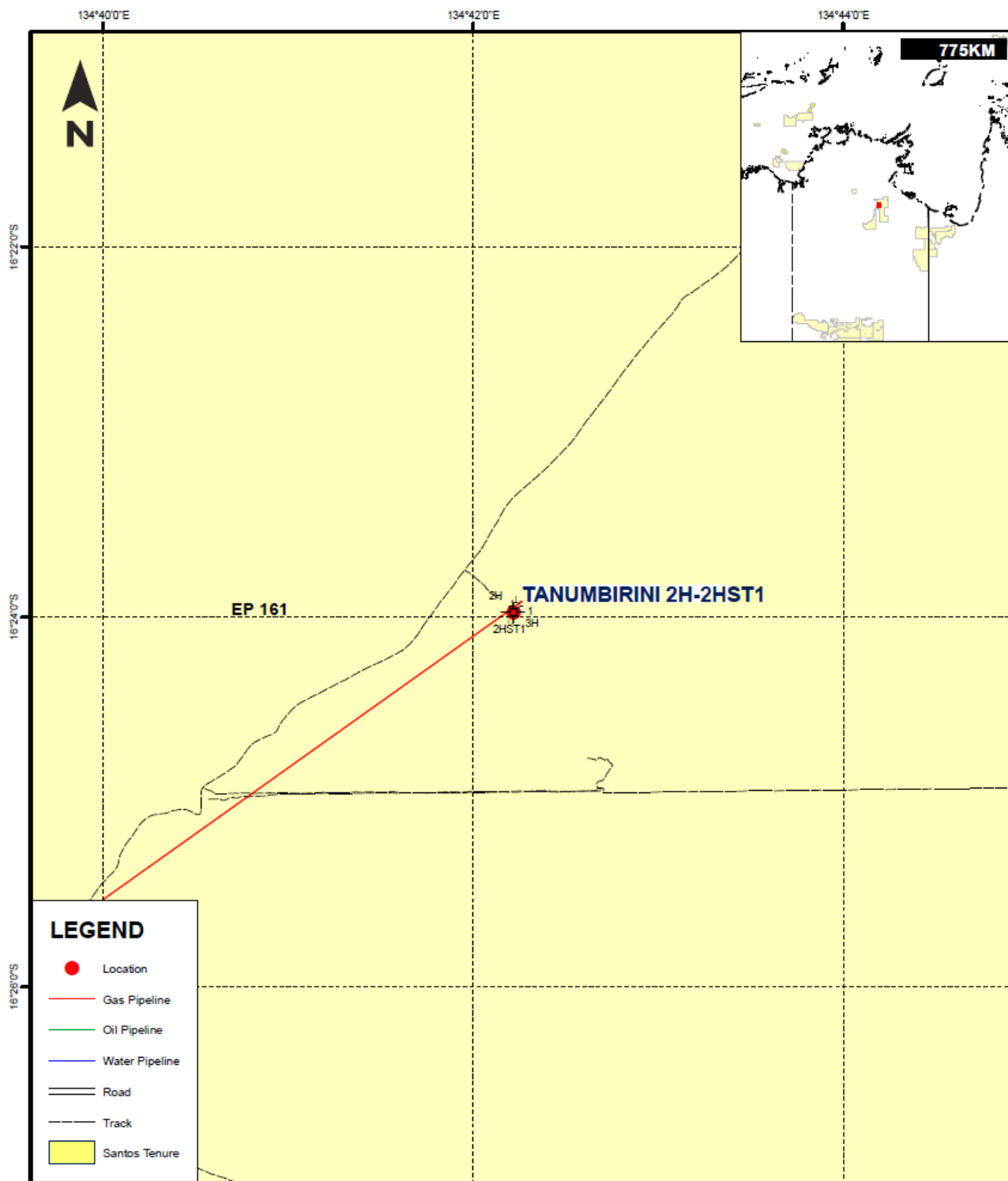
The EP 161 Velkerri prospect has been described as a Mesoproterozoic shale formation unconventional resource play that has been formally subdivided into three members: the Kyalla Member (oldest), the Amungee Member (middle) and the Wyworrie Member (youngest). Organic shale intervals within the Amungee Member have been informally subdivided into three reservoir units, the A Shale (oldest), the B Shale (middle) and the C Shale (youngest). All three shale intervals are deemed to be laterally extensive within the prospect area. The target B shale is assumed to have a relatively thick pay interval of 67m Total Vertical Thickness (TVT) based on Total Organic Content (TOC) >2% from offsets Tanumbirini 1 and Marmbulligan 1.

The EP 161 prospect area is currently defined by the western edge of the permit boundary and the estimated dry/wet gas window to the north, east and south (structural bounds) within the Beetaloo sub-basin. The permit area consists of 136 full and part graticular blocks, which are approximately 10,500km<sup>2</sup> (2.6 million acres), of which the assumed mid-case prospective area is 1,600km<sup>2</sup> (~400k ac). The gross interval of the Velkerri Formation located within the play fairway of EP 161 ranges from 1000mTVT to 1500mTVT ignoring the high variation and uncertainty on the eastern edge where faulting is prevalent. The Velkerri Formation thickness at Tanumbirini 1 is approximately 1275mTVT, which represents the thickest Velkerri isochore data point in the Beetaloo Sub-basin. The primary prospective reservoir unit is currently considered to be the B Shale.

The drilling phase of the campaign objectives has demonstrated the feasibility of placing horizontal wellbores in the Velkerri Fm and gas detection qualitatively indicates that the B Shale has the potential to successfully produce gas at commercial rates.

The Tanumbirini exploration program consisted of two ~1000m horizontal wells (Tanumbirini 2H and Tanumbirini 3H) planned to be drilled from a shared pad with a surface location approximately 75m SW of the Tanumbirini 1 well. Both wells targeted the Amungee Member B Shale and will be fracture stimulated and flow tested to prove up gas deliverability.

**Figure 1: Well location map**



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**TANUMBIRINI 2H-2HST1**

Figure 1. TANUMBIRINI 2H-2HST1 basic location map (1:50000)

Date: 2/11/2021



**2 Well Summary Sheet**

|                      |  |
|----------------------|--|
| Well Name:           | Tanumbirini 2H / Tanumbirini 2H ST1  |
| Classification:      | Exploration  |
| Permit:              | EP161 / Northern Territory   |
| Well Path:           | Sidetracked  |
| Location:            | McArthur Basin / Northern Territory<br>Latitude: 16° 23' 58.74" South (GDA94)<br>Longitude: 134° 42' 13.02" East<br>Northing: 8 186 833m<br>Easting: 468 353m                      |
| Offset Well:         | Tanumbirini 1 located ~75m NE; Marmbulligan 1 located ~23km NE.<br>Amungee NW 1 located ~ 99km W.  |
| Seismic Control:     | MCSAN 19-01; IL MCSAN 19-01, XL MCSAN 13-05  |
| Elevation:           | 214.9m AHD (GL)  |
| RT Elevation:        | 223.6m   |
| Kick off Depth:      | 3347.0m MDRT   |
| Total Depth Driller: | 3488.0m MDRT (Tanumbirini 2H)  |
| Total Depth Logger:  | N/A (Tanumbirini 2H)   |
| Total Depth Driller: | 4598.0m MDRT (Tanumbirini 2H ST1)  |
| Total Depth Logger:  | N/A (No wireline logging conducted)  |
| Casing:              | Conductor 1: 26" at 32.9m MDRT<br>Conductor 2: 13-3/8" at 235.0m MDRT<br>Surface: 9-5/8" at 1079.6m MDRT<br>Intermediate: 7" at 3327.9m MDRT<br>Production: 4-1/2" at 4511.9m MDRT |
| Spud:                | 17:15 hours on 11 <sup>th</sup> May 2021   |
| Reached TD:          | 18:00 hours on 27 <sup>th</sup> July 2021  |
| Rig Released:        | 12:00 hours on 17 <sup>th</sup> August 2021  |
| Well Status:         | Cased and Suspended Gas Well   |
| Suspended:           | 12:00 hours on 17 <sup>st</sup> August 2021  |
| PBTD:                | 4464.7m MDRT   |

Permit Interests (Voting / Investment): Santos QNT Pty Ltd 75.0 / 75.0%  
Tamboran Resources 25.0 / 25.0%

Rig Name/Type: Easternwell 106 / Land-Onshore

Drilling Contractor: Easternwell

### 3 Drilling

#### 3.1 Summary of drilling and related operations

##### **Tanumbirini 2H:**

The well was spudded at 17:15hrs on 11<sup>th</sup> May 2021 with the drilling rig Easternwell 106. The 17-1/2" deep conductor hole in this well was drilled from 32.9m to 235.7m (casing while drilling), with the 13-3/8" deep conductor set at 235.0m. A Leak Off Test (LOT) was performed to 43.9ppg Equivalent Mud Weight (EMW). The 12-1/4" surface hole was then drilled to 1082m. Ran and cemented 9-5/8" surface casing with the shoe set at 1079.6m. The 8-1/2" hole was drilled to 3409m. The 7" intermediate casing was ran in hole to 3327.9m with a pack-off observed and casing unable to pass this depth. Casing was cemented with the shoe set high at 3327.9m. A decision was made to set a kick-off cement plug and side-track Tanumbirini 2H. After setting the cement plug, a 6-1/8" drill out BHA was ran in hole and the 7" casing shoe drilled out to 3327m. A Formation Integrity Test (FIT) was conducted inside the casing shoe to 14ppg EMW. Washed and reamed 8-1/2" rat hole to 3418m. Pulled out of the hole. Ran in hole with a cement stinger and set a kick-off cement plug.

A 6-1/8" kick-off BHA was made up and time drilling occurred from 3329m to 3347m at which point 100% formation was observed, Tanumbirini 2H was side-tracked to Tanumbirini 2H ST1 at 10:00hrs on 18<sup>th</sup> July 2020. A total of 19 bit runs were performed on Tanumbirini 2H.

##### **Tanumbirini 2H ST1:**

Drilling of the 6-1/8" production hole proceeded from kick-off point at 3347m to well TD at 4598m. TD was reached at 18:00hrs, 27<sup>th</sup> July 2021. 4-1/2" production casing was run and cemented with the shoe set at 4511.9m. A total of 2 bit runs were performed on Tanumbirini 2H ST1.

While drilling Tanumbirini 2H / Tanumbirini 2H ST1, measurement While Drilling (MWD) surveys were taken at regular intervals to ensure that the well stayed within the specified +/-50m lateral constraint from well design and within the vertical tolerance window of +/-10mTVD.

One oil fluorescence show was observed during drilling operations at 1612m to 1621m drillers depth in the Kyalla Formation. 20 to 40% of sandstone cuttings exhibited oil fluorescence with a gas peak of 95 Units (60/24/11/4/1%) and background gas of 30 Units.

Several poor to good gas shows were observed in Tanumbirini 2H ST1 in the Moroak Sandstone and Wyworrie Member, with total gas peaks of up to 895 units over a background of 50 units (98/4/1%). Several good gas shows were observed in Tanumbirini 2H ST1 in the Amungee B and C Shales, with total gas peaks of up to 4482 units over a background of 200 units (98/2/Tr%).

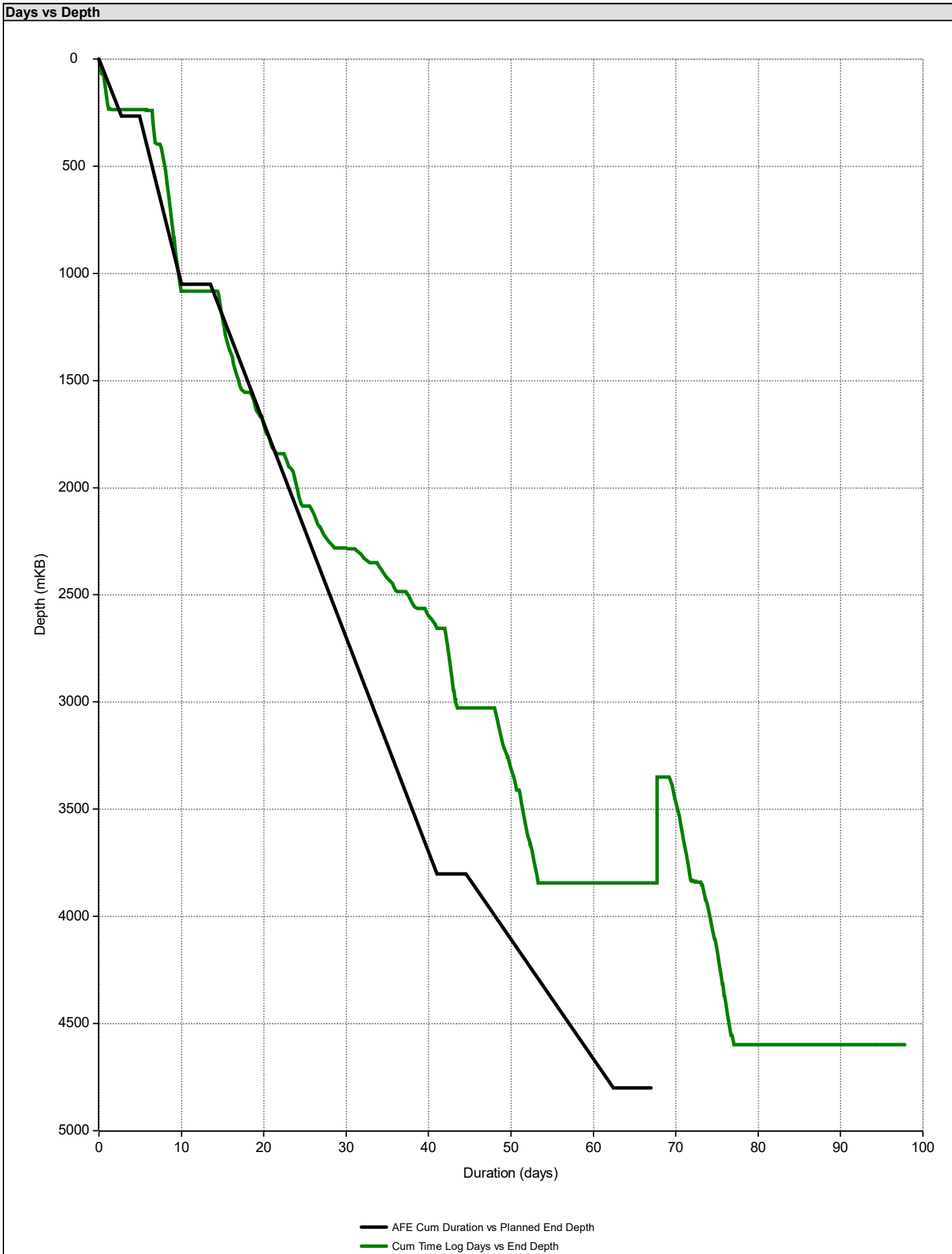
Tanumbirini 2H ST1 has been cased and suspended as a gas exploration well for completion at a later date. The rig was released at 12:00 hours, 17<sup>th</sup> August 2021.

Well Name: Tanumbirini 2H ST1

Operating Co: Santos Ltd

Rig: Easternwell, 106

### TVD Curve





### 3.2 Drilling equipment installed in or on the well

The drilling rig Easternwell 106 is an ADR 1500 type, top drive rig, with a cantilever triple mast.

Details of drilling equipment related to Easternwell 106 are enclosed in Appendix 1.

### 3.3 Casing and equipment installed in or on the well

The following table summarises casing sizes, depths and cementing details for Tanumbirini 2H and Tanumbirini 2H ST1.

**Table 1: Casing sizes, depths and cementing details**

| <b>BIT SIZE</b> | <b>DEPTH</b> | <b>CASING SIZE</b> | <b>CASING DEPTH</b> | <b>JNTS</b> | <b>CASING TYPE</b>         | <b>CEMENT</b>  |
|-----------------|--------------|--------------------|---------------------|-------------|----------------------------|--|
| 17 -1/2"        | 235.6m       | 13-3/8"            | 235.0m              | 21          | 68lb/ft<br>L80 SL-Boss     | 285.8 barrels of 11.8-15.8ppg Class 'G' cement plus additives. 3x Sentinel slurry top up cement jobs down the back side. |
| 12-1/4"         | 1082.0m      | 9-5/8"             | 1079.6m             | 93          | 53.5 lb/ft<br>P110 SL-Boss | 425.1 barrels of 11.5-15.6ppg Scavenger and Tunelight cement plus additives  |
| 8-1/2"          | 3844.0m      | 7"                 | 3327.9m             | 295         | 26 lb/ft<br>P110 SL-APEX   | 337.1 barrels of 12.5-14.5ppg Lead and Tail Elasticem plus additives   |
| 6-1/8"          | 4598m        | 4-1/2"             | 4511.9m             | 396         | 15.1 lb/ft<br>Q125HY/Q125  | 158.5 barrels of 14.5ppg Elasticem cement plus additives   |

### 3.4 Bit Records

The following table summarises bit run details for Tanumbirini 2H and Tanumbirini 2H ST1. Bit details are also available in appendix 1.

**Table 2: Bit run details**

Tanumbirini 2H:

| BIT # | MAKE                  | TYPE / MODEL           |         | SIZE    | HOURS | METERS | CONDITION  |
|-------|-----------------------|------------------------|---------|---------|-------|--------|--|
| 1     | Baker Hughes Bit Shoe | PDC                    | EZC506  | 17-1/2" | 21.2  | 202.8  | In Hole (bit shoe)                                 |
| 2     | Baker Hughes          | Mill tooth             | VM-1    | 12-1/4" | 6.0   | 3.0    | 1-2-BT-S-0-I-RR-TD                                 |
| 3     | NOV                   | PDC                    | TKC76   | 12-1/4" | 12.9  | 158.4  | 7-6-RO-N-X-I-BT-PR                                 |
| 4     | Ulterra               | PDC                    | CF713   | 12-1/4" | 48.1  | 685.0  | 0-1-BT-G-X-I-RR-TD                                 |
| 5     | Ulterra               | PDC                    | CF616   | 8-1/2"  | 67.3  | 473.0  | 1-1-CT-G-X-I-RR-PR                                 |
| 6     | NOV                   | PDC                    | TKC73   | 8-1/2"  | 62.2  | 285.0  | 8-2-RO-M-X-I-CT-DTF / PR                           |
| 7     | NOV                   | PDC                    | TKC73   | 8-1/2"  | 49.3  | 244.0  | 8-3-RO-M-X-I-WT-PR                                 |
| 8     | Baker Hughes          | Kymera Hybrid: PDC/TCI | KMX425E | 8-1/2"  | 67.6  | 197.0  | RCI: 2-5-BT-G-E-I-WT-PR<br>PDC: 2-2-WT-A-X-BT-PR   |
| 9     | Ulterra               | PDC                    | U03201  | 8-1/2"  | 2.0   | 4.0    | 8-8-RO-A-X-I-CT-PR                                 |
| 10    | Smith                 | PDC                    | Z813    | 8-1/2"  | 39.2  | 63.7   | 6-5-DL-A-X-I-CT/RO-PR                              |
| 11    | Baker Hughes          | Kymera Hybrid: PDC/TCI | KMX425  | 8-1/2"  | 53.3  | 134.3  | RCI: 3-3-WT-A-E-I-BT-PR<br>PDC: 1-2-WT-A-X-I-BT-PR |
| 12    | Halliburton           | PDC                    | GTi74DH | 8-1/2"  | 29.8  | 79.0   | 1-2-BT-S-X-I-DL-PR                                 |
| 13    | Smith                 | PDC                    | Z813    | 8-1/2"  | 33.3  | 93.0   | 0-1-WT-S-X-I-CT-TD                                 |
| 14    | Halliburton           | PDC                    | GTi74DH | 8-1/2"  | 29.7  | 371.0  | 0-1-CT-G-X-I-ER-PP                                 |
| 15    | Halliburton           | PDC                    | GTi64D  | 8-1/2"  | -     | 0.0    | 0-0-NO-A-X-I-NO-BHA                                |
| 16    | Halliburton           | PDC                    | GTi64D  | 8-1/2"  | 98.2  | 818.0  | 2-1-CT-N-X-I-NO-TD                                 |
| 17    | Halliburton           | PDC                    | GTi64D  | 8-1/2"  | -     | 0.0    | 2-1-XT-N-X-I-NO-TD                                 |

Tanumbirini 2H ST1:

| BIT # | MAKE         | TYPE / MODEL |           | SIZE   | HOURS | METERS | CONDITION              |
|-------|--------------|--------------|-----------|--------|-------|--------|------------------------|
| 18    | Baker Hughes | TCI          | STX30 537 | 6-1/8" | 0.5   | 2.0    | 1-2-CT-G-2-I-WT-DP/BHA |
| 19    | Halliburton  | PDC          | GTE64C    | 6-1/8" | 122.2 | 1249   | 0-0-ER-A-X-I-NO-TD     |

### 3.5 Drilling Fluids

The following table summarises drilling fluid details for Tanumbirini 2H.

**Table 3: Drilling fluid details for Tanumbirini 2H**

|                      |                |                       |
|----------------------|----------------|-----------------------|
| <b>Hole/Bit Size</b> |                | <b>17-1/2"</b>        |
| <b>Interval</b>      |                | <b>32.9m – 235.7m</b> |
| Drilling Fluid       | Mud Type       | KCL/Polymer           |
|                      | Mud Weight     | 8.85 – 8.9            |
|                      | Funnel vis     | 99 – 103              |
|                      | PV             | 31 – 33               |
|                      | YP             | 39 – 41               |
|                      | pH             | 9.5 – 10.0            |
|                      | API fluid loss | 5.7 – 6.0             |
|                      | Chlorides      | 24400                 |
| KCL %                | 5              |                       |
| <b>Hole/Bit Size</b> |                | <b>12-1/4"</b>        |
| <b>Interval</b>      |                | <b>235.7m – 1082m</b> |
| Drilling Fluid       | Mud Type       | KCL/Polymer           |
|                      | Mud Weight     | 9.1 – 9.4             |
|                      | Funnel vis     | 57 – 71               |
|                      | PV             | 15 – 27               |
|                      | YP             | 26 – 34               |
|                      | pH             | 9.0 – 9.3             |
|                      | API fluid loss | 4.0 – 6.2             |
|                      | Chlorides      | 29000 – 38000         |
| KCL %                | 5.5 – 8.0      |                       |
| <b>Hole/Bit Size</b> |                | <b>8-1/2"</b>         |
| <b>Interval</b>      |                | <b>1082m – 2945m</b>  |
| Drilling Fluid       | Mud Type       | KCL/Polymer           |
|                      | Mud Weight     | 10 – 10.2             |
|                      | Funnel vis     | 47 – 83               |
|                      | PV             | 14 – 32               |
|                      | YP             | 25 – 39               |
|                      | pH             | 9.0 – 9.7             |
|                      | API fluid loss | 3.6 – 5.0             |
|                      | Chlorides      | 37000 – 48000         |
| KCL %                | 7.2 – 8.0      |                       |
| <b>Hole/Bit Size</b> |                | <b>8-1/2"</b>         |
| <b>Interval</b>      |                | <b>2945m – 3844m</b>  |
| Drilling Fluid       | Mud Type       | BaraHib Plus          |
|                      | Mud Weight     | 10.1 – 10.2           |
|                      | Funnel vis     | 54 – 73               |
|                      | PV             | 20 – 26               |
|                      | YP             | 30 – 48               |
|                      | pH             | 9.1 – 9.7             |
|                      | API fluid loss | 4.4 – 5.0             |
|                      | Chlorides      | 68000 – 85000         |
| KCL %                | 8.0 – 8.2      |                       |

The following table summarises drilling fluid details for Tanumbirini 2H ST1.

**Table 4: Drilling fluid details for Tanumbirini 2H ST1.**

|                      |                |                      |
|----------------------|----------------|----------------------|
| <b>Hole/Bit Size</b> |                | <b>6-1/8"</b>        |
| <b>Interval</b>      |                | <b>3347m – 4598m</b> |
| Drilling Fluid       | Mud Type       | BaraHib Plus         |
|                      | Mud Weight     | 11.0 – 11.7          |
|                      | Funnel vis     | 54 – 67              |
|                      | PV             | 21 – 30              |
|                      | YP             | 30 – 41              |
|                      | pH             | 9.0 – 9.8            |
|                      | API fluid loss | 4.0 – 5.0            |
|                      | Chlorides      | 59000 – 95000        |
|                      | KCL %          | 7.8 – 8.7            |

## 4 Geology

### 4.1 Formation Tops

The following table summarises formation tops for Tanumbirini 2H ST1.

**Table 5: Formation tops**

| FORMATION                 | FORMATION TOPS |                |            |               |                |
|---------------------------|----------------|----------------|------------|---------------|----------------|
|                           | ACTUAL TOP     |                | High / Low | PROGNOSED TOP |                |
|                           | (MDmRT)        | (TVDmSS)       | Prognosis  | (MDmRT)       | (TVDmSS)       |
| <b>Tanumbirini 2H ST1</b> |                |                |            |               |                |
| Surficial Deposits        | 8.7            | 214.9          | -          | 8.7           | 214.9          |
| Gum Ridge Formation       | 52.0           | 171.6          | 11.6 H     | 63.6          | 160.0          |
| Inacumba Unit             | 200.3          | 23.3           | 3.3 H      | 203.6         | 20.0           |
| Cox Formation             | 582.8          | -359.2         | 0.8 H      | 583.6         | -360.0         |
| Bukalara Sandstone        | 1152.7         | -929.0         | 1.0 H      | 1153.6        | -930.0         |
| Bukalorkmi Sandstone      | 1155.6         | -931.9         | NP         | NP            | NP             |
| Kyalla Formation          | 1304.3         | -1080.6        | 5.6 L      | 1299.0        | -1075.0        |
| Lower Kyalla              | 1826.4         | -1602.6        | 1.4 H      | 1828.0        | -1604.0        |
| Moroak Sandstone          | 2074.9         | -1851.1        | 4.1 L      | 2071.0        | -1847.0        |
| Wyworrie Member (VELK)    | 2642.2         | -2418.6        | 3.4 H      | 2646.0        | -2422.0        |
| Amungee Member (VELK)     | 3156.5         | -2917.8        | 3.2 H      | 3162.0        | -2921.0        |
| <b>Total Depth</b>        | <b>4598.0</b>  | <b>-3223.2</b> | <b>-</b>   | <b>4867.0</b> | <b>-3244.0</b> |

## 4.2 Reservoir and Prospective Horizons

The Tanumbirini 2H prospect is defined as an unconventional shale play, the Amungee Member target formation is a 4-way syncline i.e., a basin, with no conventional up-dip traps apparent, therefore the low permeability source rock is the target and hydrocarbon migration, and trap geometry are not considered.

Prospects/plays defined as unconventional shale require reservoir parameters to be characterised using tight rock analysis (TRA) e.g., retort saturations, pulse-decay perm; geochemical analysis e.g., SRA, desorption, adsorption isotherms and organic petrology; and other supporting analyses such as mineralogy (XRD/XRF) and rock mechanics. The Amungee Mbr shale intervals or reservoir units are the most prospective target in EP 161. The B Shale ranks highest with similar thickness to the C Shale, but slightly better reservoir properties with respect the reservoir quality (RQ) and completion quality (CQ).

## 5 Formation Sampling

### 5.1 Drill Cuttings

The following tables summarises drilling cuttings samples for Tanumbirini 2H and Tanumbirini 2H ST1.

**Table 6: Drilling cuttings samples for Tanumbirini 2H**

| DEPTH INTERVAL (m) | SAMPLING INTERVAL IN (m) | REMARKS      |
|--------------------|--------------------------|--------------|
| 32.9 – 40          | 7.1                      | WBM drilling |
| 40 – 1270          | 10                       | WBM drilling |
| 1270 – 2860        | 3                        | WBM drilling |
| 2860 – 3095        | 5                        | WBM drilling |
| 3095 – 3788        | 3                        | WBM drilling |
| 3788 – 3838        | 5                        | WBM drilling |
| 3838 – 3844        | 6                        | WBM drilling |

**Table 7: Drilling cuttings samples for Tanumbirini 2H ST1**

| DEPTH INTERVAL (m) | SAMPLING INTERVAL IN (m) | REMARKS      |
|--------------------|--------------------------|--------------|
| 3333 – 4598        | 3                        | WBM drilling |

Detailed drill cuttings lithological descriptions are enclosed in Appendix 2.

### 5.2 Mud gas

A total of 67 Iso-Tubes were collected on Tanumbirini 2H and 19 Iso-Tubes collected on Tanumbirini 2H ST1. No onsite gas composition analysis was performed. A detailed summary of samples is enclosed in Appendix 3.

### 5.3 XRF Sampling

X-ray Fluorescence Spectroscopy (XRF) sampling was conducted from 1090m to 3844m on Tanumbirini 2H and from 3351m to 4598m on Tanumbirini 2H ST1. A detailed summary of samples are enclosed in Appendix 3.

## 6 Formation Evaluation

### 6.1 Mudlogging

Halliburton provided mudlogging services for the drilling of Tanumbirini 2H / Tanumbirini 2H ST1. This included conventional mudlogging, real time data monitoring, drilling analysis, and XRF sample analysis. Mudlogging data is enclosed in Appendix 4.

Mudlogging services were provided by Halliburton Unit 9900070 with the following parameters monitored:

1. Total Gas
2. Chromatographic Gas Breakdown (Chromatograph: C1-C5 in 60 seconds)
3. Hydrogen Sulphide Levels (3 sensors)
4. Depth/Rate of Penetration.
5. Pipe Speed/Block Position
6. Top drive RPM
7. Top drive Torque
8. Hook Load/Weight on Bit
9. Standpipe Pressure
10. Mud Pump Rate (2 pumps)
11. Mud Pit Levels (13 pits including 2 on the trip tank)
12. Mud flow paddle
13. CO<sub>2</sub> detection

### 6.2 MWD/LWD Logging

Logging While Drilling (LWD) data was acquired by Halliburton. LWD services consisted of:

- Gamma Ray and Directional in the 12-1/4" hole section from 238.6m to 1082.0m,
- Gamma Ray, Directional and Pressure While Drilling in the 8-1/2" hole section from 1082.0m to 2483m,
- Gamma Ray, Azimuthal Gamma Ray, Directional, Sonic and Pressure While Drilling in the 8-1/2" hole from 2483.0m to 2562.0m,
- Gamma Ray, Directional and Pressure While Drilling in the 8-1/2" hole section from 2562.0m to 2655m,
- Gamma Ray, Azimuthal Gamma Ray, Directional, Sonic and Pressure While Drilling in the 8-1/2" hole from 2655.0m to 3844.0m,
- Gamma Ray, Azimuthal Gamma Ray, Directional, Sonic and Pressure While Drilling in the Tanumbirini 2H ST1 6-1/8" hole from 3349.0m to well total depth at 4598m.

Field data, log displays and deviation surveys are enclosed in Appendix 5.

**Table 8: MWD/LWD run details**

| LOG (LWD)                        | SUITE/<br>RUN | INTERVAL (m)    | COMMENTS   |
|----------------------------------|---------------|-----------------|--|
| <b><u>TANUMBIRINI 2H</u></b>     |               |                 |  |
| LWD/MWD                          | 1 / 1         | 238.6 – 397.0   | GR-D&I; 12-1/4" Section                            |
| LWD/MWD                          | 1 / 2         | 397.0 – 1082.0  | GR- D&I; 12-1/4" Section                           |
| LWD/MWD                          | 1 / 3         | 1082.0 – 1082.0 | GR- D&I -PWD; 8-1/2" Section (BHA blockage)        |
| LWD/MWD                          | 1 / 4         | 1082.0 – 1555.0 | GR- D&I -PWD; 8-1/2" Section                       |
| LWD/MWD                          | 1 / 5         | 1555.0 – 1840.0 | GR- D&I -PWD; 8-1/2" Section                       |
| LWD/MWD                          | 1 / 6         | 1840.0 – 2084.0 | GR- D&I -PWD; 8-1/2" Section                       |
| LWD/MWD                          | 1 / 7         | 2084.0 – 2281.0 | GR- D&I -PWD; 8-1/2" Section                       |
| LWD/MWD                          | 1 / 8         | 2281.0 – 2285.0 | GR- D&I -PWD; 8-1/2" Section                       |
| LWD/MWD                          | 1 / 9         | 2285.0 – 2348.7 | GR- D&I -PWD; 8-1/2" Section                       |
| LWD/MWD                          | 1 / 10        | 2348.7 – 2483.0 | GR- D&I -PWD; 8-1/2" Section                       |
| LWD/MWD                          | 1 / 11        | 2483.0 – 2562.0 | RSS-GR-AzGR-D&I-PWD-SON; 8-1/2" Section            |
| LWD/MWD                          | 1 / 12        | 2562.0 – 2655.0 | GR- D&I -PWD; 8-1/2" Section                       |
| LWD/MWD                          | 1 / 13        | 2655.0 – 3026.0 | RSS-GR-AzGR-D&I-PWD-SON; 8-1/2" Section            |
| LWD/MWD                          | 1 / 14        | 3026.0 – 3026.0 | RSS-GR-AzGR-D&I-PWD-SON; 8-1/2" Section (SPP Drop) |
| LWD/MWD                          | 1 / 15        | 3026.0 – 3844.0 | RSS-GR-AzGR-D&I-PWD-SONIC; 8-1/2" Section          |
| LWD/MWD                          | 1 / 16        | 3844.0 – 3844.0 | GR- D&I -PWD; 8-1/2" Section (Wiper Trip)          |
| <b><u>TANUMBIRINI 2H ST1</u></b> |               |                 |  |
| LWD/MWD                          | 1 / 17        | 3349.0 – 4598.0 | RSS-GR-AzGR-D&I-PWD-SONIC; 6-1/8" Section          |

### 6.3 Wireline Logging

No wireline logging was conducted on Tanumbirini 2H / Tanumbirini 2H ST1.

### 6.4 Hydrocarbon Indications

#### 6.4.1 Gas detection whilst drilling

Gas levels were monitored from the surface to TD, using an FID total gas detector and FID chromatograph. Total gas was monitored in gas units (1unit = 200ppm methane equivalent in air) and the chromatograph was calibrated to measure ppm (parts per million) concentrations of the alkane gasses methane, ethane, propane, butane, and pentane.

A summary of Gas detection whilst drilling is enclosed in Appendix 6.

## LIST OF ABBREVIATIONS

|               |  |
|---------------|--|
| ADR           | Automated Drilling Rig                                       |
| AHD           | Australian Height Datum                                      |
| API           | American Petroleum Institute                                 |
| ASCII         | American Standard Code for Information Interchange           |
| Azi, AZI      | Azimuth  |
| bbbls         | Barrels (unit of volume = 42 USgallons)                      |
| BHA           | Bottom Hole Assembly   |
| BG            | Background Gas   |
| BU, B/U       | Bottoms Up   |
| CAL           | Caliper  |
| CAST          | Circumferential Acoustic Scanning Tool                       |
| CBL           | Cement Bond Log  |
| CBU           | Circulate Bottoms Up   |
| CG            | Connection Gas   |
| CSV           | Comma Separated Values ASCII file (*.csv)                    |
| CO2           | Carbon Dioxide   |
| D&I           | Direction and Inclination                                    |
| DEN           | Density  |
| DLL           | Dual Lateral Log   |
| ECD           | Effective Circulating Density                                |
| EMW           | Equivalent Mud Weight  |
| EP            | Exploration Permit   |
| FG            | Formation Gas  |
| FID           | Flame Ionization Detector                                    |
| FIT           | Formation Integrity Test                                     |
| Ftklb, ft-klb | Foot kilo pounds (measurement of torque)                     |
| GEM           | Gamma Elemental Minerology                                   |
| GL            | Ground Level   |
| gpm           | US gallons per minute  |
| GR/AzGR       | Gamma Ray/Azimuthal Gamma Ray                                |
| hi vis        | High Viscosity Mud Sweep                                     |
| hrs           | Hours  |
| HSE           | Health, Safety and Environment                               |
| IL            | InLine   |
| KCl           | Potassium Chloride   |
| Klbs          | Kilo pounds  |
| LAS           | Log ASCII Standard data file (*.LAS)                         |
| LOT           | Leak Off Test  |
| MWD/LWD       | Measurement and Logging While Drilling                       |
| MFT           | Pressure testing wireline tool                               |
| mMDRT         | Measured Depth Below Rotary Table (rig floor) in metres      |
| MSFL          | Micro Spherical Focused Log                                  |
| MSL           | Mean Sea Level (AMSL – above mean sea level)                 |
| mTVDRT        | True Vertical Depth Below Rotary Table (rig floor) in metres |
| NB            | New Bit  |
| Neut          | Neutron  |
| NP            | Not Prognosed  |
| PBTD          | Plugged Back Total Depth                                     |
| PDC           | Polycrystalline Diamond Cutters                              |
| PDF           | Portable Document Format                                     |
| pH            | Potential Hydrogen   |
| PJSM          | Pre Job Safety Meeting                                       |
| POOH, POH     | Pull Out Of Hole (tripout)                                   |
| ppg           | pounds per gallon (measurement of muddensity)                |
| psi           | pounds per square inch                                       |
| PWD           | Pressure While Drilling                                      |
| QGM           | Quantitative Gas Measurement                                 |
| RES           | Resistivity  |
| RIH           | Run in hole  |
| RPM           | Revolutions per minute                                       |
| ROP           | Rate of Penetration  |
| RR            | Re-run   |
| RSS           | Rotary Steerable System                                      |
| RQ            | Reservoir Quality  |
| SDL           | Surface Data Logging (Mudlogging)                            |
| SGR           | Spectral Gamma Ray   |
| SON           | Sonic  |
| SP            | Spontaneous Potential  |
| SPP           | Stand Pipe Pressure  |
| SRA           | Source Rock Analysis   |
| SS            | Subsea   |
| ST            | Side Track   |
| SWC           | Sidewall Cores   |
| TCI           | Tungsten Carbide Insert                                      |
| TD            | Total Depth  |
| TG            | Trip Gas   |
| TOC           | Total Organic Content  |



|        |                             |
|--------|-----------------------------|
| TRA    | Tight Rock Analysis         |
| TVD    | True Vertical Depth         |
| TVT    | Total Vertical Thickness    |
| UBD    | Underbalanced Drilling      |
| VSP    | Vertical Seismic Profile    |
| WBM    | Water based mud             |
| WOB    | Weight on bit               |
| XL     | Xline                       |
| XO,X/O | Cross over                  |
| xLOT   | Extended Leak Off Test      |
| XRD    | X-Ray Diffraction           |
| XRF    | X-Ray Fluorescence          |
| XRMI   | X-tended Range Micro Imager |
| YP     | Yield Point                 |