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**APPENDIX 7: Surat Basin Field Trip, October 2016**





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## Summary

A final field trip was undertaken to validate the interpretation of the mapping of the target formations of the Walloon Coal Measures and Springbok Sandstone. Persons on the field trip included Peter Evans (Origin Energy), Leonard Cranfield (Cranfield Geological Services International Pty Ltd), Luke Hauck and Andrew Isles (Coal Section, Geological Survey of Queensland, Department of Natural Resources and Mines). The trip covered 4 days from Brisbane to Wandoan (day 1), looking at the Westbourne Formation, Springbok Sandstone, and Walloon Coal Measures; Wandoan to Roma (day 2), checking both the section above the target units including the Gubberamunda Sandstone and Orallo Formation and the section between the Hutton Sandstone and the Walloon Coal Measures, namely outcrop of the Eurombah Formation. Day 3 focused on examining the base of the section from the Walloon Coal Measures to the base of the Surat basin sequence and into the top of the Bowen Basin. Day 4 had a singular focus to check the boundary of the Springbok Sandstone in the vicinity of Cecil Plains. Identity references for individual sites designated as SB numbers (Table 1).

Each day of the field trip visited a range of sites from the section of interest in the Surat Basin and locally, units above and below to give an extensive comparison of the sections from the base of the Surat Basin to units overlying the targeted formations.

**Table 1. Measurement and validation sites**

Day	Site	Longitude	Latitude	Proposed unit
Day 1	SB1	150.06572	-26.35400	Westbourne Formation
Day 1	SB2	150.04794	-26.25961	Springbok Sandstone
Day 1	SB3	149.91058	-26.09375	Juandah Coal Measures
Day 2	SB4	150.13250	-25.94583	Eurombah Formation
Day 2	SB5	150.12611	-25.93000	Hutton Sandstone
Day 2	SB6	150.12639	-25.90194	Hutton Sandstone
Day 2	SB7	150.20667	-25.83944	Evergreen Formation
Day 2	SB8	149.93667	-26.06361	Springbok Sandstone
Day 2	SB9	149.93972	-26.24389	Orallo Formation
Day 2	SB10	149.80139	-26.33083	Orallo Formation
Day 2	SB11	149.72750	-26.36944	Mooga Sandstone
Day 2	SB12	149.23997	-26.28350	Gubberamunda Sandstone
Day 2	SB13	149.67558	-26.26833	Gubberamunda Sandstone
Day 2	SB14	149.24314	-26.18678	Gubberamunda Sandstone
Day 2	SB15	149.24222	-26.17417	Springbok Sandstone
Day 2	SB16	149.25639	-26.11111	Walloon? Coal Measures
Day 2	SB17	149.19278	-26.02025	Eurombah Formation
Day 2	SB18	149.02639	-26.15083	Springbok Sandstone
Day 3	SB19	148.56611	-25.17889	Clematis Sandstone
Day 3	SB20	148.64431	-25.35278	Precipice Sandstone
Day 3	SB21	148.64194	-25.43889	Boxvale Sandstone Member
Day 3	SB22	148.66881	-25.49842	Westgrove Formation
Day 3	SB23	148.62814	-24.78103	Eurombah Formation
Day 3	SB24	148.56889	-26.00389	Springbok Sandstone
Day 4	SB25	151.20400	-27.53347	Springbok Sandstone
Day 4	SB26	151.14972	-27.54544	Springbok Sandstone

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## Day 1      Brisbane to Wandoan

Sections through Westbourne Formation, Springbok Sandstone and the Wandoan Trial pit

### **SB1 Westbourne Formation—road cutting**

Rock types are grey fine-grained sandstone siltstone and shales with a minor ironstone layer. This outcrop looks like the basal Norwood Mudstone Member based on its similarity to core sections in GSQ Roma 4 (Appendix 5, Plates 1, 2 and 3) and in GSQ Roma 7 (Appendix 5, Plate 5). The fine-grained sandstone locally is moderately to steeply dipping foreset beds in outcrop (Plates 1a and 1b).



*Plate 1a: Westbourne Formation showing crossbedding.*



*Plate 1b: Close up of light grey siltstones with a thin discontinuous ferruginous bed.*



## SB2 Springbok Sandstone

Exposure at this site comprises light brown, low angle trough cross-bedded feldspathic labile sandstone and siltstone. Locally, the sandstone is a silicified and quartzose in composition forming the indurated more resistant part of the cutting at the base of the photograph.



*Plate 2a: Springbok Sandstone with basal silicified sandstone bed.*

Other photographs at this road cutting show upward fining from sandstone to siltstone with clay units and locally concretionary structures (Figures 2b to 2d). The Springbok Sandstone is typically light to mid-brown and coarse-grained. The composition is usually feldspathic and labile to sublabile in composition.





*Plate 2b: Upward fining with clay layers on top of foreset beds.*



*Plate 2c: Resistant coarse-grained feldspathic labile.*





*Plate 2d: Concretionary structure in Springbok Sandstone.*

### **SB3 Juandah Coal Measures—Glencore box cut**

The exposure in the box cut is of an approximately four-metre thick seam at the base of the section. The coal is within a section of the Juandah Coal Measures sequence close to the top of the Walloon Coal Measures. The coal is overlain by unproductive brown shales and thin lithic sandstones showing differential erosion in the box cut face; white clay beds are interpreted as air fall tuff layers.



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## Day 2      Wandoan to Roma

The field trip on day 2 looked at identifying the basal part of sequence below the Walloon Coal Measures.

### **SB4 Eurombah Formation?**

There is poorly exposed sandy material to the west of this site. It is interpreted as Eurombah Formation and is included on the current interpretation.

### **SB5 Hutton Sandstone (upper)**

Light brown, feldspathic sublabile sandstone, minor siltstone with low angle crossbedding.



*Plate 3a: Resistant exposure of upper Hutton Sandstone.*



*Plate 3b: Panorama view of upper Hutton outcrop.*





Plate 3c: Upper Hutton Sandstone. Note minor normal faulting in left central part of photo with a throw of 1–2cm.

### **SB6 Hutton Sandstone (not Eurombah)**

### **SB7 Evergreen Formation**

### **SB8 Springbok Sandstone**

Floaters brown quartzose sandstone

### **SB9 Orallo Formation**

Pebble conglomerate in cutting with fossil wood. This unit was correlated as the fossil wood member of the Blythesdale Formation

### **SB10 Orallo Formation**

Light grey, flat lying, low angle cross beds, coarse sandstone and granule to pebble conglomerate



Plate 4a: Panorama view of Orallo Formation road cutting.





*Plate 4b: Orallo Formation central part of road cutting.*



*Plate 4c: Orallo Formation close up of lithic conglomerate.*



## SB11 Mooga Sandstone

Thick bedded to massive feldspathic sublamine coarse-grained sandstone generally thin internal bedding



*Plate 5a: Thick bedded feldspathic sublamine sandstone—far view.*



*Plate 5b: Thick bedded feldspathic sublamine sandstone—medium distance view.*





*Plate 5c: Thick bedded feldspathic sublabilite sandstone—close up—flat bedded to massive.*

### **SB12 Gubberamunda Sandstone**

In creek with fossil wood floaters from Orallo Formation

### **SB13 Gubberamunda Sandstone**

Brown, quartzose sandstone with high angle foreset beds





*Plate 6a: Gubberamunda Sandstone—massive sandstone with high angle trough crossbedding immediately downstream of permanent spring.*

## **SB14 Gubberamunda Sandstone**



*Plate 6b: High angle foresets with interference ripples on foresets near spring.*



## **SB15 Springbok Sandstone**

Quartz-rich sandstone very soft and flaggy

## **SB16 Springbok or Walloon?**

Lithic sandstone overlying mudstone



*Plate 7: Felspatho-lithic labile sandstone and mudstone.*

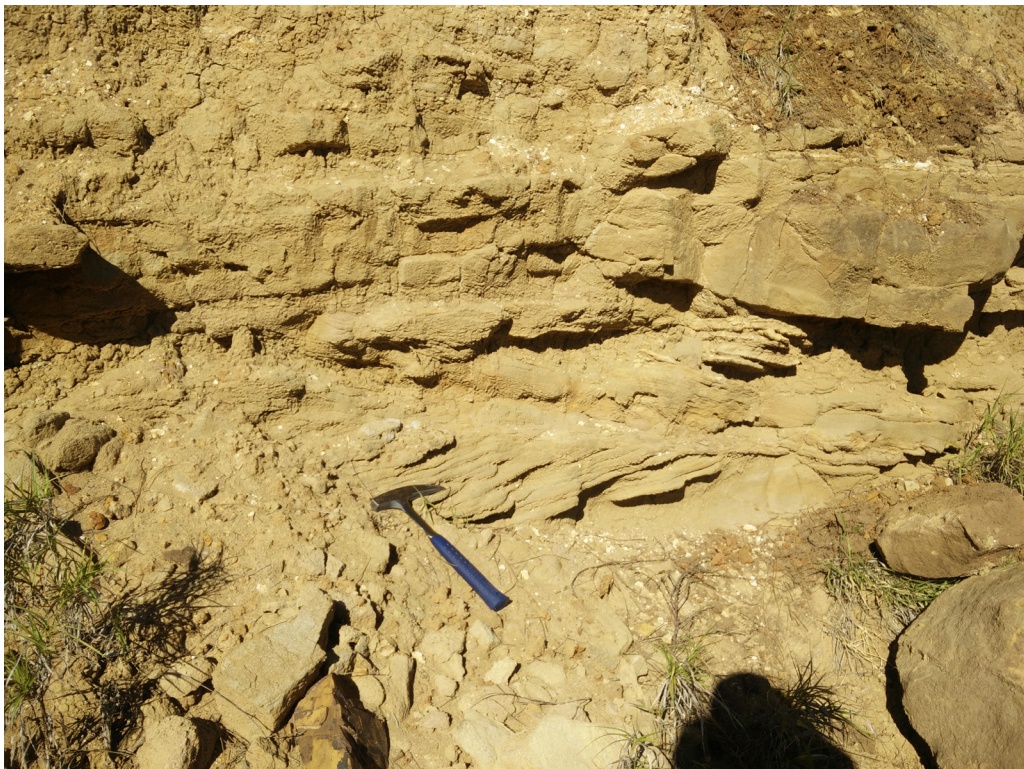


## SB17 Eurombah Formation

Brown, lithic labile sandstone with cross bedding looks similar in outcrop to Hutton, but different lithology. It contains abundant lithic clast and locally small ironstone concretions.



*Plate 8a: Eurombah Formation—lithic labile massive to thick bedded sandstone minor cross beds.*



*Plate 8b: Cross bedded lithic labile sandstone.*





*Plate 8c: Ironstone concretion within Eurombah Formation.*



*Plate 8d: Lithofeldspathic labile sandstone of the Eurombah Formation.*



## SB18 Springbok Sandstone



*Plate 9: Flaggy sandstone comprising about 30% of the exposure thin cm thick bedding.*



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## Day 3 Roma to Rolleston (Bowen and Surat sections)

### SB19 Clematis Sandstone

White feldspathic sublamine to quartzose micaceous sandstone. Low angle cross beds with some burst fractures (vertical in section). These appear to be similar to those shown in seismic sections through the Bowen Basin sequence. These seem to be fractures with little or no displacement in the Bowen Basin Sequence but are more prominent in the overlying Surat Basin.



Plate 10a: Clematis Sandstone—light grey feldspathic sublamine to quartzose sandstone.



Plate 10b: Panorama of road cutting.





*Plate 10c: Very thick bedded light grey to buff sandstone with vertical fractures.*





*Plates 10d,e: Thick bedded sandstone with thin internal laminae cut by vertical fractures with possible fluid migration.*



### **SB20 Precipice Sandstone (upper)—Dawson River 3<sup>rd</sup> crossing**

Fine medium grained porous quartzose sandstone in creek which is characteristically flat lying. Comment by Peter Evans that this part of the Precipice Sandstone has a lower water yield than the underlying coarser grained section.

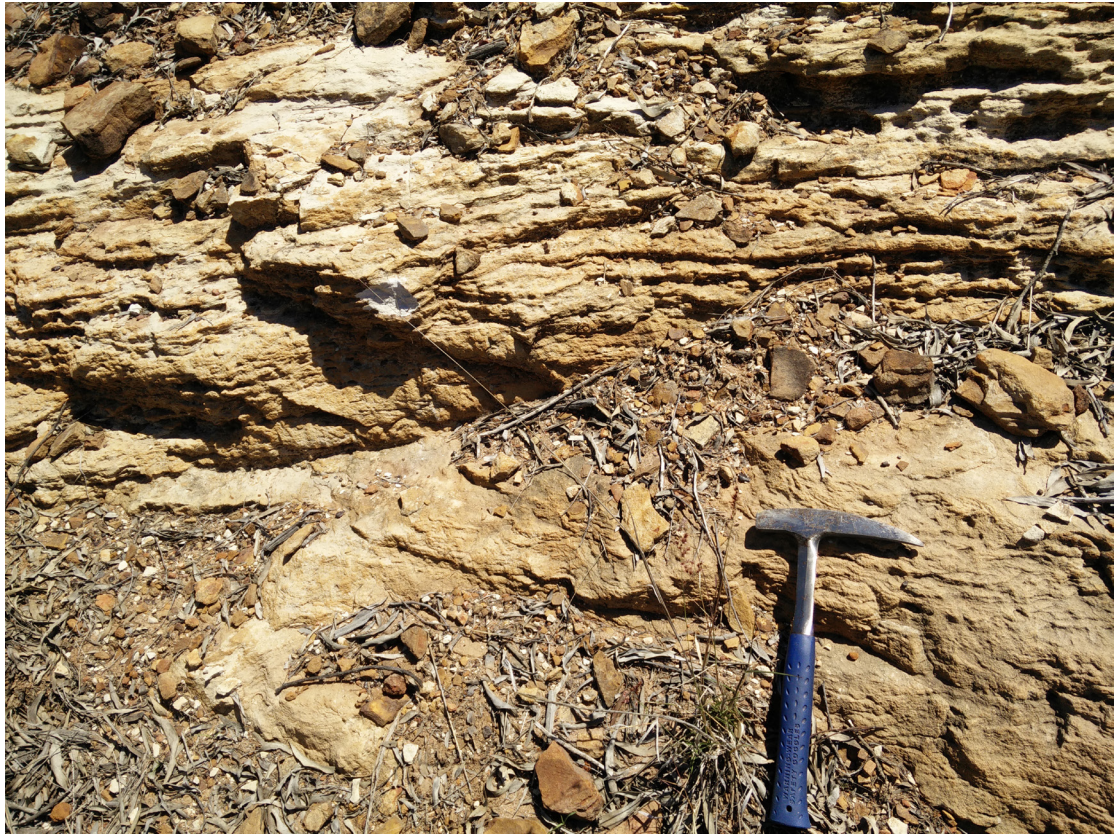
### **SB21 Boxvale Sandstone Member**

Massive flat bedded quartzose sandstone, which locally has a silica cement with quartz grain overgrowths.



*Plate 11a: Thick bedded to massive Boxvale Sandstone Member.*





*Plate 11b: Feldspathic sandstone locally silicified with quartz overgrowths.*



## SB22 ?Westgrove Ironstone Member

Ferruginous quartzose sandstone with red clayey material from ant nests. This is mapped as Westgrove Ironstone Member; the outcrop is ferruginous but there was no evidence of ferruginous oolite characteristic of this unit.

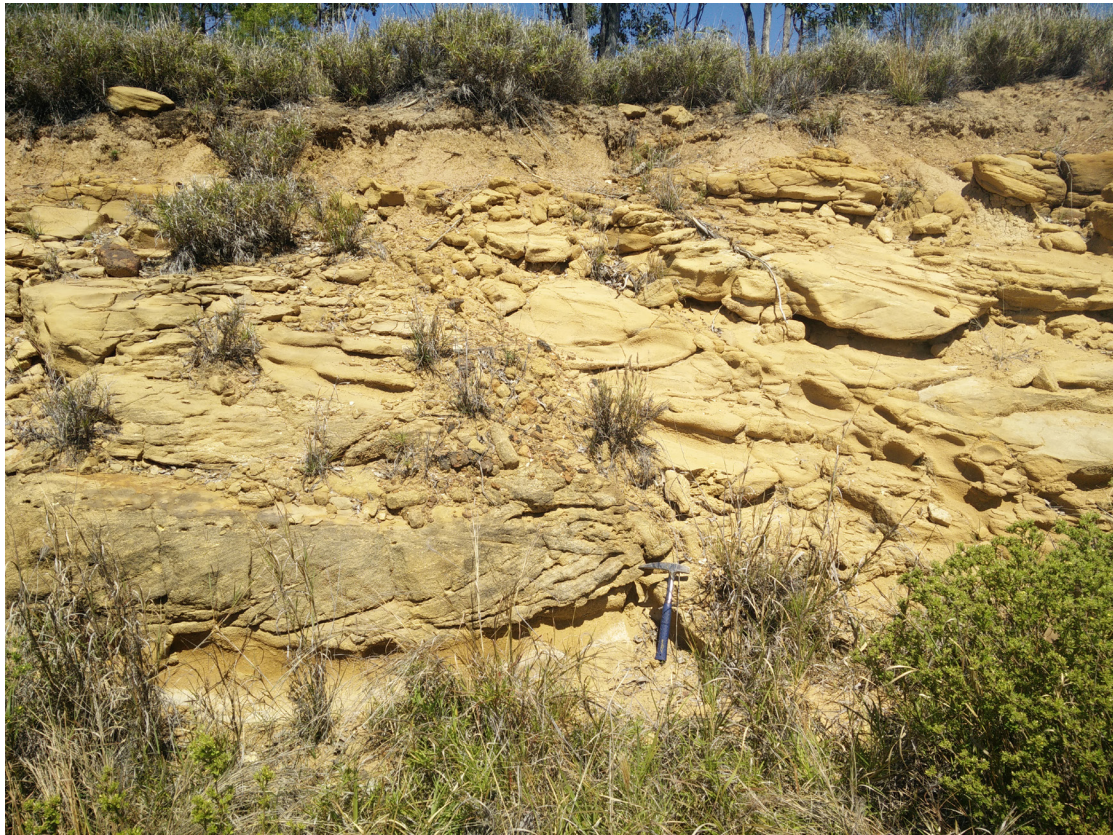


*Plate 12: Massive ferruginous sandstone.*



## SB23 Eurombah Formation—Injune—Rolleston Road

Lithic labile sandstone and granule lithic conglomerate; steeper dips locally



*Plate 13a: Cross bedded lithofeldspathic labile sandstone.*



*Plate 13b: Panorama Eurombah Formation.*



## SB24 Springbok Sandstone

Feldspathic labile sandstone and siltstone



*Plate 14a: Panorama of interbedded mudstone and cross bedded sandstone.*



*Plate 14b: Close up of laminated cross bedded feldspathic sublamine sandstone.*



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## Day 4      Roma to Brisbane

Inlier of Springbok Sandstone to west of main outcrop was checked

### **SB25 Springbok Sandstone—Cecil Plains Weir**



*Plate 15: Outcrop of silcrete – silicified sandstone.*

### **SB26 Springbok Sandstone**

Scrape in lateritised feldspathic sandstone on Cecil Plains – Tara Road, which is most likely Springbok Sandstone. It appears to be used extensively as a local source of road base.