

## Appendix 4: HyLogger and XRF data from outcrop and core samples

HyLogger data was acquired from outcrop samples collected during the November 2015 field program and from selected core samples held by GSQ. Table 1 indicates the stratigraphic attribution and visual descriptions of the that were examined using the HyLogger and portable XRF and mineralogy (e.g. quartz, kaolinite, carbonates, albite and white mica) from use of the Thermal infrared (TIR).

The minerals identified from the HyLogger data included ankerite, dickite, calcite, kaolinite, montmorillonite, muscovitic illite, paragonite and siderite in the SWIR data and albite, albite, antigorite, biotite, dolomite, gypsum, haematite, illite, jarosite, kaolinite, labradorite, magnesite, microcline, montmorillonite, muscovite, nontronite, oligoclase, orthoclase, pyrophyllite, quartz and siderite in the TIR data.

**Table 1. Summary of HyLogger and XRF data from outcrop and core samples (NS = not sampled).**

Sample	Latitude	Longitude	Description	Proposed unit	Dip	Azimuth	K%*10	Th	Swir minerals	Tir minerals
GSQ Roma 4 - @ 1.22m depth (4')	-26.24843	149.83443	MUDSTONE, SILTSTONE	Westbourne Formation			10.7	15	NS	NS
GSQ Roma 4 - @ 44.8m depth (147')	-26.24843	149.83443	MUDSTONE, SILTSTONE	Westbourne Formation			9.6	10	NS	NS
GSQ Roma 4 - @ 56.99m depth	-26.24843	149.83443	MUDSTONE, SILTSTONE	Westbourne Formation			11.6	11	NS	NS
GSQ Roma 4 - @ 148.43m depth (487')	-26.24843	149.83443	SANDSTONE, feldspathic	Springbok Sandstone			9.1	12	NS	NS

Sample	Latitude	Longitude	Description	Proposed unit	Dip	Azimuth	K%*10	Th	Swir minerals	Tir minerals
GSQ Roma 7 - @ 25.25m depth (82'10')	-26.24843	149.83443	MUDSTONE, SILTSTONE	Westbourne Formation			8.9	9	NS	NS
GSQ Roma 7 - @ 34.39m depth (112'10')	-26.24843	149.38444	MUDSTONE, SILTSTONE	Westbourne Formation			10.2	20	NS	NS
GSQ Roma 7 - @ 114.90m depth (377')	-26.24843	149.38444	SANDSTONE, feldspathic	Springbok Sandstone			14.8	8	NS	NS
GSQ Roma 7 - @ 189.07m depth (620'4')	-26.24843	149.38444	MUDSTONE	Walloon Coal Measures			8.3	9	NS	NS
DRD25 - @ 24.18m depth	-26.26093	148.72890	MUDSTONE	Westbourne Formation			7.1	4	NS	NS
DRD25 - @ 27.38m depth	-26.26093	148.72890	MUDSTONE	Westbourne Formation			6.0	15	NS	NS
DRD25 - @ 70.30m depth	-26.26093	148.72890	SANDSTONE	Springbok Sandstone			13.4	24	NS	NS

Sample	Latitude	Longitude	Description	Proposed unit	Dip	Azimuth	K%*10	Th	Swir minerals	Tir minerals
SPOK1 outcrop	-26.8219	150.504	SANDSTONE with CONGLOMERATE	Springbok Sandstone	5	198	4.6	9	Kaolinite, dickite	Kaolinite, quartz, albite, muscovite
SPOK 2 outcrop	-26.811	150.511	SANDSTONE, feldspathic, labile, locally with cross beds & fossil wood boulders	Springbok Sandstone	-	-	6.0	7	Kaolinite, montmorillonite	Kaolinite, microcline, quartz
SPOK 3 outcrop	-26.798	150.485	SANDSTONE, medium to thick bedded feldspathic, beds to 10 cm	Springbok Sandstone	18	71	5.0	5	Kaolinite,	Quartz, kaolinite
Kum2 outcrop	-26.493	150.077	SANDSTONE, feldspathic sandstone, siltstone with pisolithic gravel at top	Orallo Formation	12	70	0.9	5	Kaolinite, montmorillonite	Kaolinite, gypsum, jarosite
3A outcrop	-26.262	150.047	SANDSTONE, feldspathic, more quartz than lithics, has concretions & cross beds	Springbok Sandstone			1.9	5	Montmorillonite, calcite	Calcite, illite, albite
6A outcrop	-26.12	149.941	SANDSTONE, SHALE with CONGLOMERATE beds, cross beds with iron sandstone nodules	Springbok Sandstone	12	200	NS	NS	Montmorillonite, kaolinite	Montmorillonite, quartz (30%), oligoclase, labradorite
11 outcrop	-25.928	150.123	SANDSTONE, feldspathic - quartz	Hutton Sandstone	15	210	10.8	12	Kaolinite, montmorillonite	Kaolinite, quartz (25%), antigorite?
15 outcrop	-25.974	149.987	SANDSTONE, feldspathic - lithic	Walloon Coal Measures			5.2	9	Montmorillonite, calcite, siderite	Siderite, illite, quartz (25%)
18A outcrop	-26.155	149.857	SANDSTONE, feldspathic, large cross beds (source from south)	Springbok Sandstone			9.5	11	Kaolinite, montmorillonite	Kaolinite, montmorillonite, quartz, microcline, albite, oligoclase
21 outcrop	-26.134	149.773	GRAVEL, coarse, unconformably over SANDSTONE, moderately feldspathic & weathered	Tertiary / Springbok Sandstone			3.3	10	Montmorillonite, kaolinite,	Montmorillonite, muscovite, orthoclase, illite
24A outcrop	-26.09	149.64	Coarse gravel unconformably over SANDSTONE, feldspathic, medium to coarse grained, with concretions, weathered	Tertiary / Springbok Sandstone	7	335			Montmorillonite	Montmorillonite, nontronite, dolomite, siderite, labradorite, microcline, magnesite

Sample	Latitude	Longitude	Description	Proposed unit	Dip	Azimuth	K%*10	Th	Swir minerals	Tir minerals
26A outcrop	-25.878	149.676	SANDSTONE, feldspathic, medium to coarse grained, friable, no cross beds	Springbok Sandstone			4.6	5	Montmorillonite, siderite, kaolinite	Siderite, illite, montmorillonite, quartz (30%), calcite, orthoclase
28 outcrop	-25.564	149.767	MUDSTONE with thin feldspathic labile SANDSTONE	Walloon Coal Measures	3	82			Kaolinite, calcite	Calcite, siderite, illite
30A outcrop	-25.481	149.811	SANDSTONE, slightly feldspathic, more numerous shale planar beds	Hutton Sandstone	3	220	12.2	12	Kaolinite	Quartz (49%), kaolinite, albite?
31 outcrop	-25.308	149.912	SANDSTONE, medium grained, quartz rich, massive, well jointed	Boxvale Sandstone Member of Evergreen Formation			0.9	8	Kaolinite	Quartz (80%), kaolinite, pyrophyllite
32A outcrop	-25.634	149.69	SANDSTONE, lithic, coarse	Walloon Coal Measures	7	255			Montmorillonite, calcite, siderite, ?ankerite	Dolomite, albite
32B outcrop	-25.661	149.423	SANDSTONE, coarse, lithofeldspathic to lithic	Walloon Coal Measures			5.1	8	Montmorillonite, kaolinite	Montmorillonite, quartz (19%)
34 outcrop	-25.662	149.353	SANDSTONE, feldspathic, massive to banded	Walloon Coal Measures	9	125			Kaolinite, montmorillonite	Quartz (66%), kaolinite, albite, illite, microcline
35A outcrop	-25.623	149.299	SANDSTONE, feldspathic, well sorted, thick bedded to massive	Lower Hutton Sandstone			15.4	6	Kaolinite, ? ? muscovitic illite	Quartz (70%), albite, kaolinite
36 outcrop	-25.64	149.245	SANDSTONE, fine to medium grained, laminated bedding, low angle cross bedding	Lower Hutton Sandstone			20.0	18	Kaolinite, montmorillonite	Quartz (60%), illite, kaolinite, albite
36A outcrop	-25.671	149.212	SANDSTONE, quartz rich	Boxvale Sandstone Member, Evergreen Formation			7.8	5	Kaolinite, montmorillonite	Quartz (85%), albite
37A outcrop	-25.672	149.214	SANDSTONE, feldspathic, well sorted, medium grained	Hutton Sandstone	20	350	7.8	5	Kaolinite, montmorillonite	Kaolinite, quartz, albite, microcline

Sample	Latitude	Longitude	Description	Proposed unit	Dip	Azimuth	K%*10	Th	Swir minerals	Tir minerals
37B outcrop	-25.702	149.186	SILTSTONE, SANDSTONE & SHALE, feldspathic, moderately well sorted	Boxvale Sandstone Member, Evergreen Formation					Kaolinite, muscovitic illite	Quartz (74%), albite, illite
38A outcrop	-25.816	149.009	SANDSTONE, feldspathic, slightly micaceous & SHALE	Top Hutton Sandstone	4	130			Montmorillonite, paragonite, illite	Quartz (38%), montmorillonite, albite
38B outcrop	-25.814	148.879	SANDSTONE, quartzose, coarse	Boxvale Sandstone Member, Evergreen Formation					Kaolinite,	Quartz (80%), kaolinite? albite
40A outcrop	-26.062	148.615	SANDSTONE, feldspathic, labile, coarse	Springbok Sandstone			6.1	5	Montmorillonite, kaolinite	Montmorillonite, albite
40B outcrop	-26.064	148.517	SANDSTONE, quartzose, iron rich	Springbok Sandstone mapped as Gubberamunda Sandstone					Kaolinite, calcite	Calcite, quartz
40C outcrop	-26.094	148.434	SANDSTONE, feldspathic, cross bedded	Gubberamunda Sandstone	5	85	4.7	4	Kaolinite, montmorillonite	Kaolinite, Quartz (47%)
41A outcrop	-25.92	148.549	SANDSTONE, lithofeldspathic, labile, medium to coarse grained	Walloon Coal Measures			4.6	7	Montmorillonite, kaolinite	Montmorillonite, quartz (20%), siderite
41A outcrop	-25.92	148.549	SANDSTONE, lithofeldspathic, labile, medium to coarse grained	Walloon Coal Measures						
41B outcrop	-25.987	148.653	SANDSTONE, feldspathic, labile, medium to coarse grained	Springbok Sandstone?	8	90	2.7	6	Montmorillonite, calcite	Calcite, albite
41D outcrop	-26.066	148.817	SANDSTONE, lithofeldspathic, low angle cross bedding, well sorted	Walloon Coal Measures	8	230			Kaolinite	Haematite, illite, quartz (low), albite
42A outcrop	-26.111	148.92	SANDSTONE, feldspathic, medium to coarse grained, well sorted, flaggy with kaolinic matrix	Springbok Sandstone	3	15	6.8	6	Kaolinite, montmorillonite	Quartz, kaolinite, albite, ?antigorite

Sample	Latitude	Longitude	Description	Proposed unit	Dip	Azimuth	K%*10	Th	Swir minerals	Tir minerals
42B outcrop	-26.163	148.982	SILTSTONE, fine to medium grained, soft, friable, thick to moderate bedding	Springbok Sandstone	20	156	7.9	8	Montmorillonite, kaolinite	Kaolinite, quartz? antigorite (30%)
43 outcrop	-26.185	149.212	MUDSTONE, flaggy, soft, muscovite & quartz	Westbourne Formation			14.8	14	Kaolinite, ? montmorillonite	Quartz? montmorillonite, Kaolinite
43A outcrop	-26.261	149.25	SANDSTONE, gravel / cobble	Gubberamunda Sandstone	5	142	16.1	22	Montmorillonite, kaolinite	Montmorillonite, quartz
43B outcrop	-26.305	149.239	SANDSTONE, lithic to lithofeldspathic	Orallo Formation	10	215			Montmorillonite, calcite	Montmorillonite, calcite, quartz
45 outcrop	-26.318	149.228	SANDSTONE, fine grained, quartzose, well sorted	Mooga Sandstone			19.4	8	Kaolinite, montmorillonite	Quartz, Kaolinite, illite? orthoclase
47B outcrop	-26.439	149.09	SANDSTONE, feldspathic, slightly micaceous, thinly bedded	Mooga Sandstone?	8	350	13.6	11	Kaolinite	Kaolinite, quartz, antigorite? (chloritic clays?), biotite, albite
47c outcrop	-26.35	149.129	SANDSTONE, brown, feldspathic, very coarse, steeply dipping	Orallo Formation			5.1	8	Kaolinite, montmorillonite	Quartz, Albite
49 outcrop	-27.067	150.858	SANDSTONE, white, feldspathic - quartzose, coarse, strongly channelised	Gubberamunda Sandstone	15	210	1.0	5	Kaolinite	Kaolinite, albite, quartz (16%), illite