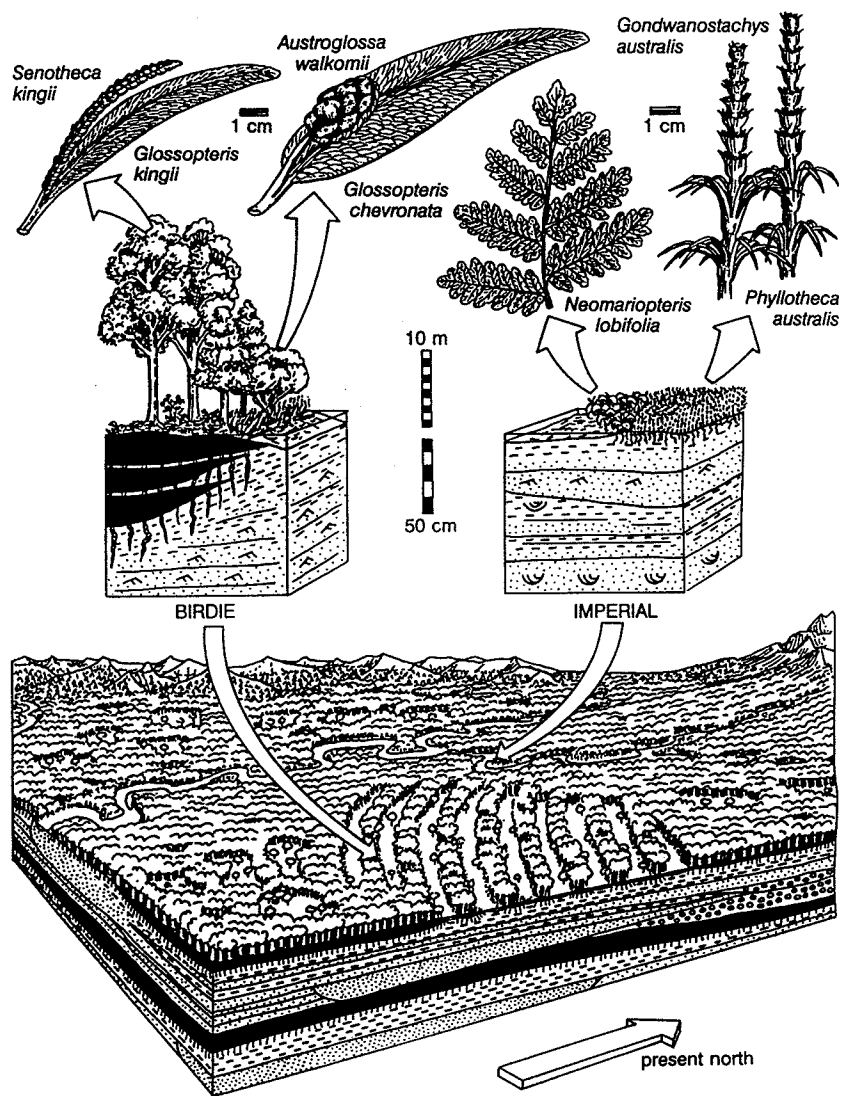


CHEMICAL AND PETROGRAPHIC DATA FOR PALEOSOLS ACROSS THE PERMIAN-TRIASSIC BOUNDARY IN THE SYDNEY BASIN, AUSTRALIA

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APPENDIX 1. Individual named Permian and Triassic paleosols in the Sydney Basin, Australia

| Measured section | Section Level (m) | Paleosol Name |
|------------------|-------------------|--------------------------------|
| Coal Cliff | 17.5 | type Imperial clay |
| Wybung Head | 19.8 | type Birdie coal |
| Coal Cliff | 19.8 | Birdie coal |
| Wybung Head | 20.2 | type Wybung silty clay |
| Coal Cliff | 20.2 | Wybung clay |
| Wybung Head | 20.6 | type Frazer clay |
| Wybung Head | 30.0 | type Bongon clay |
| Wybung Head | 30.3 | Frazer clay thin surface phase |
| Wybung Head | 31.5 | Bongon clay eroded phase |
| Wybung Head | 32.2 | Frazer clay |
| Coxs Gap | 32.5 | type Kerrabee clay |
| Coxs Gap | 33.3 | type Wollemi clay |
| Coxs Gap | 33.9 | type Cox clay |

APPENDIX 2. Description of the paleosol type profiles

| Depth (cm) | Hz | Rock | Color | Other features | Micromorphology | Contact |
|---|----|---|----------------------------|---|---|--|
| <i>type Birdie coal paleosol at Wybung Head</i> | | | | | | |
| - | - | Claystone breccia above | Dark olive gray (5Y3/2) | Common coal chips black (5Y-2.5/2); fine root traces and joint stain yellowish brown (10YR-5/6); noncalcareous | Agglomeroplastic undulic, with scattered illuviation argillans | Abrupt smooth to |
| 0 | O | Coal | Black (5Y2.5/2) | Banded with bright and dull layers, some small (2-7 mm) claystone clasts yellowish brown (10YR5/6); noncalcareous | Unistrial porphyroskelic undulic: few angular claystone clasts in upper 20 cm only | Abrupt wavy (± 10 cm over 80-120 cm) to |
| 126 | A | Silty claystone | Dark gray (5Y4/1) | Common black (5Y2.5/1) carbonaceous roots of <i>Vertebraria</i> up to 3 cm diameter; few carbonized logs up to 118 mm wide and 3 mm thick; joint stain yellowish brown (10YR5/6); noncalcareous | Unistrial mosaic agglomeroplastic, with common carbonized organic matter and very poorly sorted rock fragments; lesser quartz and feldspar. | Gradual irregular to |
| 134 | Bw | Clayey siltstone | Gray (5Y5/1) | Common black <i>Vertebraria</i> as above, taper to only 12 mm diameter in lower part: platy peds and discontinuous slickensides; clear relict beds of sandstone; noncalcareous | Unistrial mosaic intertextic; abundant rock fragment grains, few opaque and quartz; common organans and argillans | Gradual wavy to |
| 208 | C | Coarse-grained sandstone, with shaley interbeds | Gray to light gray (5Y6/1) | Shaley interbeds of gray (5Y-5/1); grains white (5Y8/1), dark gray (5Y4/1) and black (5Y-2.5/1); joint stain yellowish brown (10YR5/4); noncalcareous | Silasepic in sandy horizons, insepic in shaley horizons; granular with abundant rock fragments | Gradual smooth to |
| <i>type Bongon clay paleosol at Wybung Head</i> | | | | | | |
| - | - | Fine-grained sandstone above | Greenish gray (5GY5/1) | Massive to weakly bedded; joint stain dark yellowish brown (10YR4/6); weakly calcareous | Silasepic intertextic; lithic sandstone, with local displacive siderite cement | Abrupt wavy (load casts $\pm 6-8$ cm by 12-15 cm) to |
| 0 | A | Silty claystone | Olive (5Y5/3) | Common root traces up to 2 mm diameter of light olive gray (5Y6/2); indistinct platy peds; noncalcareous | Agglomeroplastic clinobimasepic; with varvelike relict bedding, disrupted by ferruginized root traces | Clear smooth to |
| 3 | A | Fine sandy siltstone | Olive gray (5Y5/2) | Common root traces of light olive gray (5Y6/2); mangans of yellowish brown (10YR5/8); mottles from siderite oxidation of strong brown (7.5YR5/6); noncalcareous | Silasepic granular, with abundant rock fragments in weakly ferruginized siderite cement | Abrupt smooth to |
| 8 | A | Carbonaceous silty claystone | Dark greenish gray (5Y4/1) | Common root traces up to 3 mm diameter of very dark gray (5Y3/1); fine blocky peds defined by slickensided clay skins of dark greenish gray (5GY4/1); noncalcareous | Porphyroskelic clinobimasepic, with sideritic root traces within sesquioxides; common rock fragments, some quartz, feldspar, siderite | Gradual wavy (± 5 cm) to |

APPENDIX 2. continued

| Depth (cm) | Hz | Rock | Color | Other features | Micromorphology | Contact |
|---|----|---------------------------------|------------------------------|---|--|------------------------------------|
| <i>type Bongon clay paleosol at Wybung Head continued</i> | | | | | | |
| 34 | Bg | Claystone | Bluish gray (5G5/1) | Common root traces up to 5 mm diameter of dark brown (7.5YR3/2); irregular mottles 2-3 cm across of brown to dark brown (7.5YR4/2); coarse blocky angular peds, defined by discontinuous slickensided clay skins: noncalcareous | Porphyroclastic to mosaic agglomeroplastic, with siderite filled sesquioxides after root traces as above; common rock fragments, quartz and feldspar | Gradual smooth to |
| 52 | C | Siltstone with shale interbeds | Olive gray (5Y5/2) | Shaley interbeds dark olive gray (5Y3/2); silty laminae and wavy bedding; non-calcareous | Insepic agglomeroplastic, few clay skins; common rock fragments | Abrupt smooth to |
| <i>type Cox clay paleosol at Coss Gap</i> | | | | | | |
| - | - | Siltstone above | Light gray (5Y7/1) | Shaley laminae dark gray (5Y4/1) and sideritic layers oxidized to brown (7.5YR5/2) and strong brown (7.5YR5/6); noncalcareous | Insepic intertextic with common rock fragments and opaque grains; some opaque mottles | Abrupt smooth to |
| 0 | A | Carbonaceous silty claystone | Dark grayish brown (2.5Y4/2) | Common root traces and coal chips of black (5Y2.5/1); platy peds indistinct; noncalcareous | Mosaic to clinobimasepic agglomeroplastic, with laminated argillans and ferruginized root traces | Gradual irregular (\pm 8 cm) to |
| 18 | AB | Clayey medium-grained sandstone | Grayish brown (2.5Y5/2) | Common root traces of very dark grayish brown (2.5Y5/2) and sand-sized sphaerosiderite oxidized to reddish brown (5YR4/3); some grains very dark gray (5Y3/1); coarse angular blocky peds; noncalcareous | Agglomeroplastic clinobimasepic, with opaque neosesquans on ped faces and around sphaerosiderite and some opaque mottles | Gradual highly irregular to |
| 28 | Bg | Medium-grained sandstone | Weak red (10R4/2) | Common drab-haloed root traces light olive gray (5Y6/2) and pyrolusite dendrites black (5Y2.5/1); indistinct relict bedding; noncalcareous | Agglomeroplastic mosaic, with common sand-sized clasts and equant opaque mottles | Gradual smooth to |
| 54 | C | Medium-grained sandstone | Weak red (10R4/2) | Indistinct relict bedding, noncalcareous | Agglomeroplastic insepic common rock fragments | Abrupt smooth to |
| <i>type Frazer clay paleosol at Wybung Head</i> | | | | | | |
| - | - | Coarse-grained sandstone above | Gray (5Y5/1) | Sand grains strong brown (7.5YR4/6), olive (5Y5/3), white (5Y8/2); pebbles to 18 cm reddish brown (5YR4/4) and very dark gray (5Y3/1) chert, and pale olive (5Y6/4) mafic volcanic fragments; trough cross bedding; basal contact ferruginized brownish yellow (10YR6/8); noncalcareous | Intertextic silasepic; a poorly sorted sandstone with abundant rock fragments, and common quartz and opaque grains | Abrupt smooth to |

APPENDIX 2. continued

| Depth (cm) | H _z | Rock | Color | Other features | Micromorphology | Contact |
|--|----------------|------------------------------|----------------------------|---|--|-------------------|
| <i>type Frazer clay at Wybung Head continued</i> | | | | | | |
| 0 | A | Silty claystone | Olive gray (5Y4/2) | Root traces to 3 mm diameter dark grayish brown (2.5Y3/2), weathering pinkish gray (7.5YR-6/2); coarse blocky angular peds and joints stained brownish yellow (10YR5/8); noncalcareous | Agglomeroplastic mosaic, with thick laminated clay skins after root traces common rock fragments, some quartz and feldspar | Gradual smooth to |
| 9 | C | Silty fine-grained sandstone | Gray (5Y5/1) | Common root traces up to 6 mm diameter dark grayish brown (2.5Y4/2), weathering as above; laminae and joints stained strong brown (7.5YR-5/8); noncalcareous | Intertextic insepic, poorly sorted, with scattered laminated clay skins; common rock fragments, some quartz | Abrupt smooth to |
| 25 | C | Sandy siltstone | Olive gray (5Y5/2) | Laminae of fine-grained sandstone light gray (5Y7/1); relict wavy bedding; noncalcareous | Intertextic insepic, with few laminated clay skins; abundant rock fragments | Gradual smooth to |
| <i>type Imperial clay paleosol at Coalcliff</i> | | | | | | |
| - | - | Fine-grained sandstone | Light gray (5Y7/2) | Shale interbeds and laminae very dark gray (5Y4/1); common ripple marks and scour-and-fill; noncalcareous | Agglomeroplastic insepic unistrial; common rock fragments, some quartz and feldspar | Abrupt smooth to |
| 0 | A | Shaley siltstone | Very dark gray (5Y4/1) | Common black (5Y3/1) fine root traces and disrupted laminae of gray (5Y5/1) siltstone; common horsetails (<i>Paracalamites australis</i>) and rare fragments of <i>Glossopteris</i> ; noncalcareous | Intertextic argillasepic unistrial, with varvelike graded laminae | Gradual smooth to |
| 3 | A | Siltstone | Very dark gray (5Y4/1) | Root traces and silty laminae as above; indistinct platy peds; noncalcareous | Intertextic argillasepic unistrial, with varvelike graded laminae | Abrupt smooth to |
| 15 | C | Medium-grained sandstone | Gray to light gray (5Y6/1) | Common ripple marks and wavy beds; shaley interbeds of dark gray (5Y4/1); grains of white (5Y8/1) and dark gray (5Y4/1); noncalcareous | Granular silasepic, with abundant rock fragments, common quartz and opaque grains | Abrupt smooth to |
| <i>type Kerrabee clay paleosol at Coxs Gap</i> | | | | | | |
| - | - | Fine-grained sandstone | Weak red (10R5/2) | Crude relict bedding; common iron-manganese nodules of reddish black (10R2.5/1) to 1 cm in size, some oxidized from siderite; noncalcareous | Agglomeroplastic mosaic, with common siderite-filled cracks; opaque nodules and neosesquans. | Abrupt smooth to |
| 0 | A | Silty claystone | Weak red (10R5/2) | Abundant drab-haloed root traces to 3 cm across of olive gray (5Y5/2); common small (less than 3 mm) nodules of reddish brown (5YR4/3); fine blocky peds; noncalcareous | Porphyroskelic mosaic, with peds defined by nearly opaque neosesquans and quasisesquans | Gradual smooth to |

APPENDIX 2. continued

| Depth (cm) | H _z | Rock | Color | Other features | Micromorphology | Contact |
|---|----------------|--------------------------------|-------------------------|---|--|----------------------|
| <i>type Kerrabee clay continued</i> | | | | | | |
| 6 | Co | Clayey siltstone | Weak red (10R5/2) | Common irregular fine root traces of light brownish gray (2.5Y6/2) and some burrows up to 6 mm diameter of reddish brown (5YR4/3); thick relict beds of silty fine-grained sandstone; noncalcareous | Agglomeroplastic insepic; with common opaque mottles and scattered clay skins | Gradual irregular to |
| 47 | C | Medium grained sandstone | light gray (5Y7/1) | Flaggy bedding and ripple marks common; some pyrolusite dendrites of black (5Y2.5/1); noncalcareous | Granular silasepic, with abundant rock fragments, some weathered before deposition, common quartz and opaque grains | Abrupt smooth to |
| <i>type Wollemi clay paleosol at Cox's Gap</i> | | | | | | |
| - | - | Medium-grained sandstone above | Weak red (10R4/2) | Indistinct relict bedding, noncalcareous | Agglomeroplastic insepic with common rock fragments, some quartz, feldspar and opaque grains | Abrupt smooth to |
| 0 | A | Silty Claystone | Reddish brown (5YR4/3) | Abundant drab-haloes 2-3 mm wide of light olive gray (5Y6/2) around root traces up to 4 mm diameter; medium blocky subangular peds defined by slickensided clay skins; noncalcareous | Porphyroclastic clinobimasepic, common sideritic siltstone filled sesquorganans after root traces; opaque mottles; some thick laminated clay skins | Gradual irregular to |
| 9 | Bw | Silty claystone | Dusky red (10R3/2) | Common drab-haloes root traces of light olive gray (5Y6/2); indistinct platy peds; noncalcareous | Agglomeroplastic clinobimasepic, common clay-filled tubules after root traces; opaque mottles | Gradual irregular to |
| 59 | Cg | Fine-grained sandstone | Weak red (10R5/2) | Crude relict bedding; common iron-manganese nodules of reddish black (10R2.5/1) up to 1 cm in size, some of them oxidized from siderite; noncalcareous | Agglomeroplastic mosaic; with common siderite filled cracks; opaque nodules and neoesquans. | Abrupt smooth to |
| <i>type Wybung clay paleosol at Wybung Head</i> | | | | | | |
| - | - | Medium-grained sandstone above | Light gray (5Y7/1) | Prominent relict bedding; mottles yellowish brown (10YR-5/4); grains dark gray (5Y4/1), white (5Y8/1); basal ferruginized surface strong brown (7.5YR-5/6); noncalcareous | Granular silasepic, with abundant sand-size rock fragments, many with clayey and oxidized rims that predate deposition | Abrupt smooth to |
| 0 | A | Siltstone | Grayish brown (2.5Y5/2) | Root traces to 3 mm diameter olive brown (2.5Y4/4); indistinct clay skins dark grayish brown (2.5Y4/2) define fine subangular blocky peds; noncalcareous | Agglomeroplastic mosaic, with sesquorganans after fossil plant debris; common rock fragments and quartz | Gradual irregular to |

APPENDIX 2. continued

| Depth (cm) | Hz | Rock | Color | Other features | Micromorphology | Contact |
|---------------------------------------|----|-------------------------|------------------------------|---|---|-------------------|
| <i>type Wybung paleosol continued</i> | | | | | | |
| 11 | Bw | Clayey siltstone | Dark grayish brown (2.5Y4/2) | Common root traces of olive brown (2.5Y4/2) and clay skins of very dark grayish brown (2.5YR3/2), defining fine subangular blocky peds; joint stain strong brown (7.5YR5/6); non-calcareous | Agglomeroplastic mosaic, with scattered clay skins and disrupted bedding; common rock fragments, quartz; intertextic silasepic metagranotubules after burrows | Gradual smooth to |
| 29 | C | Claystone breccia above | Dark olive gray (5Y3/2) | Common coal chips black (5Y2.5/2); fine root traces and sesquans along joints of yellowish brown (10YR5/6); noncalcareous | Agglomeroplastic in undulic, with scattered illuviation argillans | Abrupt smooth to |

Note: Descriptive terminology is after Brewer (1976), Munsell Color Company (1975) and Soil Survey Staff (1990).

APPENDIX 3. Munsell colors of selected Permian and Triassic paleosols in the Sydney Basin, Australia

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|--------------------------|------|---------------------------|----------------------------------|--|
| Coalcliff section | | | | |
| sandstone, 0.2 m | - | - | gray (5Y5/1) | - |
| sandstone, 0.5 m | - | - | gray 5Y5/1) | - |
| sandstone, 1.2 m | - | - | light brownish gray (2.5Y6/2) | carbonaceous streaks very dark gray (5Y3/1) |
| Imperial, 1.8 m | A | - | very dark gray (5Y3/1) | root traces black (5Y2.5/1) |
| | C | - | very dark gray (5Y3/1) | sandy ripple marks gray (5Y5/1) |
| sandstone, 2.7 m | - | - | light gray (2.5Y7/2) | claystone clasts very dark gray (5Y3/1), quartz pebbles gray (5Y5/1); iron stain yellowish brown (10YR5/8) |
| siltstone, 3.7 m | - | - | dark grayish brown (2.5Y4/2) | - |
| sandstone, 4.5 m | - | - | light gray (5Y7/2) | - |
| sandstone, 5.5 m | - | - | light gray (5Y7/2) | - |
| siltstone, 6.2 m | - | - | very dark gray (5Y3/1) | - |
| sandstone, 6.6 m | - | - | light gray (5Y7/1) | siltstone interbeds very dark gray (5Y3/3); iron stain dark yellowish brown (10YR4/4) |
| sandstone, 7.2 m | - | - | light gray (5Y7/1) | - |
| siltstone, 7.5 m | - | - | very dark gray (5Y3/1) | sandy laminae of light gray (5Y7/1) |
| sandstone, 7.7 m | - | - | light gray (5Y7/1) | quartz clasts white (5Y8/1) |
| siltstone, 8 m | - | - | very dark gray (5Y3/1) | sandy ripple marks (5Y7/1) |
| sandstone, 8.2 m | - | - | light olive brown (2.5Y5/4) | ferruginized base dark yellowish brown (10YR4/6) |
| siltstone, 8.3 m | - | - | very dark gray (5Y3/1) | sandy laminae light gray (5Y7/1) |
| sandstone, 8.5 m | - | - | light brownish gray (2.5Y6/2) | iron stain dark yellowish brown (10YR4/4) |
| siltstone, 8.7 m | - | - | dark gray (5Y4/1) | sandy ripple marks light gray (5Y7/1) |
| sandstone, 9.3 m | - | - | light brownish gray (2.5Y6/2) | carbonaceous laminae dark grayish brown (2.5Y3/2) |
| siltstone, 9.5 m | - | - | grayish brown (2.5Y5/2) | - |
| sandstone, 9.7 m | - | - | light brownish gray (2.5Y6/2) | claystone clasts dark olive gray (5Y3/2) and light yellowish brown (10YR6/6) |
| shale, 10 m | - | - | dark gray (5Y4/1) | siltstone interbeds gray (5Y5/1) |
| Birdie, 12 m | O | R1704, R1705 | black (5Y2.5/1) | joint stain strong brown (7.5YR5/6) |
| | A | R1706, R1707 | very dark gray (5Y3/1) | <i>Vertebraria</i> black (5Y2.5/1) |
| | Bw | R1708, R1709, R1710 | dark gray (5Y4/1) | joint stain yellowish brown (10YR5/6) |
| | C | R1711, R1712 | dark gray (5Y4/1) | sandstone interbeds (2.5Y5/2) |
| sandstone, 12.5 m | - | R1703 | light gray (5Y7/2) | - |
| sandstone, 13.5 m | - | - | grayish brown (2.5Y5/2) | clasts very dark gray (2.5Y3/1), olive gray (5Y5/2) and brown (7.5YR5/4) |
| shale, 15.2 m | - | - | dark gray (5Y4/1) | carbonaceous debris black (5Y2.5/1), mica light gray (5Y7/2) |
| sandstone, 15.5 m | - | - | light gray (2.5Y7/2) | - |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|--------------------|------|---|------------------------------|--|
| type Imperial clay | A | R1699 | very dark gray (5Y4/1) | silty laminae gray (5Y5/1), root traces black (5Y3/1) |
| | C | R1700 | gray (5Y5/1) | shale interbeds very dark gray (5Y4/1) |
| | - | R1701 | gray to light gray (5Y6/1) | clasts of white (5Y8/1) and dark gray (5Y4/1); shale interbeds gray (5Y5/1) |
| | - | R1702 | gray to light gray (5Y6/1) | shale interbeds gray (5Y5/1) and dark gray (5Y4/1) |
| Birdie coal, 20 m | - | - | gray to light gray (5Y6/1) | - |
| | O | R1690, R1691, R1692, R1693, R1688 | black (5Y2.5/1) | joint stain light olive brown (2.5Y5/6) |
| | A | R1694 | black (5Y2.5/1) | joint stain brownish yellow (10YR6/6) and dark yellowish brown (10YR4/4) |
| | Bw | R1695, R1696 | dark gray (5Y4/1) | <i>Vertebraria</i> black (5Y2.5/1), joint stain dark yellowish brown (10YR3/4) |
| | C | R1697 | gray (5Y5/1) | silstone interbeds light gray (5Y7/1) |
| | - | R1698 | dark gray (5Y4/1) | sandstone interbeds and ripple trains light gray (2.5Y7/2) |
| conglom., 20 m | - | R1689 | brownish yellow (10YR6/6) | siderite pebbles dark grayish brown (2.5Y4/2), with weathering rinds yellowish brown (10YR5/8); other clasts yellow (2.5Y8/6) and white (2.5Y8/2); sandstone matrix light gray (5Y7/2) with grains of white (5Y8/2) and olive gray (5Y5/2) |
| Wybung clay | A | R1682, R1683 | gray to light gray (5Y6/1) | root traces and clay skins very dark gray (5Y3/1) |
| | Bw | R1684, R1685 | gray (5Y5/1) | sphaerosiderite reddish brown (5YR4/3) and brown (7.5YR5/4) |
| | C | R1686 | dark grayish brown (2.5Y4/2) | sphaerosiderite brown (7.5YR5/4) |
| | C | R1687 | black (5Y2.5/1) | - |
| sandstone, 21 m | - | - | gray (5Y5/1) | shale interbeds dark gray (5Y6/1); siderite nodules and bands dark brown (7.5YR3/2), weathering strong brown (7.5YR5/6) |
| sandstone, 22 m | - | - | gray (5Y5/1) | - |
| conglom. 23.5 m | - | - | gray (5Y5/1) | siderite nodules very dark gray (5Y7/3), with inner weathering rind very dark gray (5YR3/4), outer rind (7.5YR4/6) |
| sandstone, 25 m | - | - | gray to light gray (5Y6/1) | grains light gray (5Y7/1), very dark gray (5Y3/1), reddish brown (5YR4/3) |
| sandstone, 26 m | - | - | gray to light gray (5Y6/1) | laminae very dark gray (5Y3/1) |
| sandstone, 26.5 m | - | - | gray to light gray (5Y6/1) | laminae brown to dark brown (7.5YR4/2) |
| claystone, 27 m | - | - | gray (5Y7/1) | inner weathering rind brownish yellow (10YR6/6), outer rind reddish brown (5YR4/4) |
| shale, 27.5 m | - | - | gray (5Y5/1) | sideritic bands gray (5Y4/1), with inner weathering rind brownish yellow (10YR6/6) and outer rind of strong brown (7.5YR4/6) |
| shale, 27.7 | - | - | dark gray (5Y4/1) | grading down to gray (5Y5/1), siderite bands gray (5Y4/1), weathering brownish yellow (10YR6/6) |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|-------------------|------|-----------------|----------------------------|--|
| siltstone, 28.2 m | - | - | gray (5Y5/1) | clayey siltstone interbeds dark gray (5Y4/1), sideritic claystone gray (5Y5/1), with weathering rind brownish yellow (10YR6/6) and strong brown (2.5YR4/6) |
| siltstone, 28.7 m | - | - | dark gray (5Y4/1) | siderite bands gray (5Y5/1), with inner weathering rind brownish yellow (10YR6/6) and outer rind strong brown (7.5YR5/6) |
| sandstone, 29 m | - | - | light gray (5Y7/1) | siderite band yellowish brown (10YR5/6) |
| claystone, 29.2 m | - | - | dark gray (5Y4/1) | siderite band yellowish brown (10YR5/6) |
| sandstone, 29.5 m | - | - | light gray (5Y7/1) | carbonaceous laminae brown to dark brown (7.5YR4/4) |
| shale, 30 m | - | - | gray (5Y5/1) | siderite band gray (5Y5/1), weathering dark yellowish brown (10YR4/4) |
| sandstone, 30.3 m | - | - | light gray (5Y7/1) | shale interbeds gray to light gray (5Y6/1), siderite band gray (5Y7/1), weathering yellowish brown (10YR5/6) |
| shale, 30.7 m | - | - | gray (5Y5/1) | siderite bands gray (5Y5/1), inner weathering rind brown (10YR5/3) and outer rind strong brown (7.5YR4/6) |
| sandstone, 31.3 m | - | - | gray to light gray (5Y6/1) | laminae strong brown (7.5YR4/6) |
| siltstone, 31.5 m | - | - | gray (5Y5/1) | - |
| sandstone, 31.7 m | - | - | gray to light gray (5Y6/1) | - |
| siltstone, 31.8 m | - | - | gray (5Y5/1) | - |
| sandstone, 32 m | - | - | gray to light gray (5Y6/1) | - |
| Frazer, 32.4 m | A | R1904 | dark gray (5Y4/1) | root traces very dark gray (5Y3/1) |
| Bongon, 33.6 m | A | R1913, R1914 | very dark gray (5Y3/1) | root traces black (5Y2.5/1) |
| | Bw | R1915, R1916 | gray (5Y5/1) | root traces very dark gray (5Y3/1) |
| | Bw | R1917, | gray (5Y5/1) | mottles brown to dark brown (7.5YR4/2) |
| | C | R1918, R1903 | gray (5Y5/1) | siderite nodules and bands weathering yellowish brown (10YR5/6) |
| Frazer, 33.8 m | A | R1910, R1911 | dark gray (5Y4/1) | - |
| | C | R1912 | gray (5Y5/1) | laminae gray to light gray (5Y6/1), siderite nodules dark gray (5Y4/1), weathering to yellowish brown (10YR5/6) |
| Frazer, 34.3 m | A | R1906 | dark gray (5Y4/1) | root traces very dark gray (5Y3/1) |
| | C | R1907 | gray (5Y5/1) | laminae and siderite nodules dark gray (5Y4/1), weathering yellowish brown (10YR5/4) |
| | - | R1908, R1909 | gray to light gray (5Y6/1) | - |
| siltstone, 34.4 m | - | R1905 | gray to light gray (5Y6/1) | laminae and joint stain dark yellowish brown (10YR4/4), sideritic lower part gray (5Y5/1), weathering yellowish brown (10YR4/4) |
| shale, 34.7 m | - | - | dark gray (5Y4/1) | siderite bands dark gray (5Y4/1), weathering yellowish brown (10YR5/4) |
| Frazer, 34.9 m | A | - | gray (5Y5/1) | root traces dark yellowish brown (10YR4/4) |
| shale, 35.2 m | - | - | dark gray (5Y4/1) | - |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|----------------------------|------|--------|----------------------------|--|
| shale, 35.5 m | - | - | gray (5Y7/1) | siderite bands gray (5Y5/1), weathering yellowish brown (10YR5/4) |
| sandstone, 35.8 m | - | - | gray (5Y5/1) | sideritic base weathered yellowish brown (10YR5/6) |
| Frazer, 36.2 m | - | - | dark gray (5Y4/1) | root traces very dark gray (5Y3/1) |
| sandstone, 36.4 m | - | - | light gray (5Y6/1) | sideritic stain brown (7.5YR5/4) |
| Bongon, 37.5 m | A | - | olive gray (5Y4/2) | root traces and plant debris brown to dark brown (7.5YR4/2) |
| | Bw | - | light olive gray (5Y5/2) | mottles brown to dark brown (7.5YR4/2) |
| | C | - | olive gray (5Y5/2) | - |
| sandstone, 37.7 m | - | - | light gray (5Y7/1) | sideritic stain brownish yellow (10YR6/6) |
| Bongon, 38.7 m | A | - | greenish gray (5GY6/1) | root traces light gray (5Y7/1), mottles brown (7.5YR5/4) |
| | Bw | - | greenish gray (5GY5/1) | root traces light gray (5Y3/1), mottles brown (7.5YR5/4) |
| | C | - | gray (5Y5/1) | root traces light gray (5Y7/1), sphaerosiderite brown (7.5YR5/4) |
| sandstone, 38.8 m | - | - | dark gray (5Y4/1) | grains very dark gray (5Y3/1); sideritic stain weathering brown to dark brown (7.5YR4/2) |
| Frazer, 39.1 m | A | - | gray (5Y7/1) | root traces dark gray (5Y4/1) |
| shale | - | - | gray (5Y5/1) | sideritic bands dark gray (5Y4/1), weathering brownish yellow (10YR6/6) |
| Frazer, 39.8 m | A | - | gray (5Y5/1) | root traces light brown (7.5YR4/4), siltstone laminae light gray (5Y7/1) |
| sandstone, 40 m | - | - | dark gray (5Y4/1) | - |
| Frazer, 40.3 m | A | - | very dark gray (5Y3/1) | root traces black (5Y2.5/1) and gray to light gray (5Y6/1) |
| | C | - | gray (5Y7/1) | - |
| siltstone, 40.4 m | - | - | gray (5Y5/1) | siderite bands dark gray (5Y4/1), weathering brown (7.5YR3/4) |
| sandstone, 40.8 m | - | - | gray to light gray (5Y6/1) | - |
| siltstone, 41.2 m | - | - | gray (5Y5/1) | - |
| sandstone, 41.3 m | - | - | gray to light gray (5Y6/1) | - |
| shale, 41.4 m | - | - | dark gray (5Y3/1) | siltstone laminae gray to light gray (5Y6/1) |
| Frazer, 41.6 m | A | - | dark gray (5Y4/1) | root traces black (5Y2.5/1) |
| | C | - | gray to light gray (5Y6/1) | - |
| sandstone, 41.8 m | - | - | light gray (5Y7/1) | - |
| Frazer, 42.6 m | A | - | dark gray (5Y4/1) | root traces very dark gray (5Y5/1) |
| | C | - | gray (5Y5/1) | siderite nodules gray (5Y5/1), weathering yellowish brown (10YR5/6) |
| siltstone, 42.7 m | - | - | gray (5Y5/1) | siltstone ripple trains grayish brown (2.5Y5/2) |
| siltstone, 43 m | - | - | gray to light gray (5Y6/1) | - |
| Wybung Head section | | | | |
| conglom., 0.2 m | - | - | greenish gray (5G6/1) | pebbles of red (2.5YR4/6) jasper, greenish gray (5GY5/1) conglomerate, grayish green (5G4/2) and very dark gray (5Y3/1) chert, light gray (2.5Y7/2) tuff, and light gray (5Y7/1) vein quartz |
| sandstone, 1 m | - | - | greenish gray (5GY6/1) | fossil logs black (5Y2.5/1) and dark yellowish brown (10YR6/6) |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|------------------------|------|---------------------------|------------------------------|--|
| conglom., 1.7 m | - | - | greenish gray (5GY6/1) | - |
| conglom., 2.7 m | - | - | greenish gray (5GY6/1) | - |
| sandstone, 3.3 m | - | - | greenish gray (5GY6/1) | - |
| conglom., 4 m | - | - | greenish gray (5GY6/1) | - |
| conglom., 5 m | - | - | greenish gray (5GY6/1) | - |
| sandstone, 5.7 m | - | - | greenish gray(5GY6/1) | grains of white (5Y8/1) and dark gray (5Y4/1); pebbles red (2.5YR4/6) jasper, very dark gray (2.5Y3/1) chert, white (2.5Y8/2) tuff and white (5Y8/1) vein quartz |
| conglom., 6.7 m | - | - | bluish gray (5G5/1) | pebbles of dark red (2.5YR5/6) jasper, olive gray (5Y4/2) sandstone and dark greenish gray (5BG4/1) chert |
| sandstone, 8.7 m | - | - | greenish gray (5G6/1) | - |
| conglom., 9.2 m | - | - | bluish gray (5G5/1) | - |
| conglom., 10.2 m | - | - | bluish gray (5G5/1) | - |
| conglom., 11.2 m | - | - | bluish gray (5G5/1) | - |
| conglom., 11.7 m | - | - | bluish gray (5G5/1) | pebbles dark red (2.5YR3/6) jasper, olive gray (5Y4/2) and brown to dark brown (7.5YR4/2) sandstone, white (10YR8/2) tuff, bluish gray (5G5/1) conglomerate and very dark gray (2.5Y3/1) |
| sandstone, 13.7 m | - | - | greenish gray (5G6/1) | grains white (5Y8/1) and black (5Y2.5/1); fossil logs dark brown (7.5YR3/2) |
| conglom., 14.2 m | - | - | bluish gray (5G5/1) | - |
| sandstone, 14.7 m | - | - | greenish gray (5GY5/1) | grains white (5Y8/1)and black (5Y2.5/1) |
| conglom., 15.7 m | - | - | greenish gray (5GY5/1) | - |
| sandstone, 16 m | - | - | greenish gray (5Y5/1) | pebbles dark greenish gray (5Y4/1) |
| sandstone, 16.7 m | - | - | greenish gray (5Y5/1) | - |
| type Birdie coal | O | R1668, R1669, R1670 | black (5Y2.5/1) | cleat stain yellowish brown (10YR5/6) |
| | A | R1671, R1672 | dark gray (5Y4/1) | <i>Vertebraria</i> black (5Y2.5/1) |
| | Bw | R1673, R1674 | gray (5Y5/1) | <i>Vertebraria</i> black (5Y2.5/1) |
| | C | R1675, R1676, R1677 | gray (5Y5/1) | <i>Vertebraria</i> black (5Y2.5/1); sandstone interbeds gray to light gray (5Y6/1) |
| | - | R1678, R1679, R1680 | gray to light gray (5Y6/1) | grains white (5Y8/1) and dark gray (5Y4/1); plant debris black (5Y2.5/1); shale interbeds (5Y5/1); joint stain yellowish brown (10YR5/4) |
| type Wybung silty clay | A | R1662, R1663 | grayish brown (2.5Y5/2) | root traces olive brown (2.5Y4/4); clay skins dark grayish brown (2.5Y4/2) |
| | Bw | R1664, R1665 | dark grayish brown (2.5Y4/2) | root traces olive brown (2.5Y4/4); clay skins very dark grayish brown (2.5YR3/2); joint stain strong brown (7.5YR5/6) |
| | C | R1666, R1667 | dark olive gray (5Y3/2) | coal chips black (5Y2.5/2); joint stain yellowish brown (10YR5/6) |
| type Frazer clay | A | R1657 | olive gray (5Y4/2) | root traces very dark grayish brown (2.5Y3/2), weathering pinkish gray (7.5YR6/2); outcrop stain brownish yellow (10YR5/8) |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|-----------------------------------|------|---------------------------|-------------------------------|---|
| | C | R1658, R1659 | gray (5Y5/1) | root traces dark grayish brown (2.5Y4/2), weathering purplish gray (7.5YR6/2); iron stained laminae strong brown (7.5YR5/8) |
| | - | R1660 | olive gray(5Y5/2) | weathering rind yellowish brown (10YR5/6) |
| | - | R1661 | light gray (5Y7/1) | grains white (5Y8/1) and dark gray (5Y4/1); mottles yellowish brown (10YR5/4) |
| sandstone, 20.9 m | - | R1656 | gray (5Y5/1) | grains white (5Y8/2), olive (5Y5/3), and strong brown (7.5YR4/6); pebbles reddish brown (5YR4/4) jasper, pale olive (5Y6/4) rock fragments and very dark gray (5Y3/1) chert; basal iron stain brownish yellow (10YR6/8) |
| sandstone, 21.7 m | - | - | greenish gray (5GY6/1) | pebbles of strong brown (7.5YR4/6) jasper, white (2.5Y8/1) and very dark gray (5Y3/1) vein quartz |
| sandstone, 23.3 m | - | - | greenish gray (5GY6/1) | - |
| conglom. 23.9 m | - | - | greenish gray (5GY6/1) | pebbles red (2.5YR4/6) jasper, grayish green (5G5/2) and very dark gray (5Y3/1) chert; weathering brownish yellow (10YR6/6) |
| sandstone, 25.1 m | - | - | greenish gray (5GY6/1) | weathering brownish yellow (10YR6/6) |
| sandstone, 26.4 m | - | - | greenish gray (5GY6/1) | weathering brownish yellow (10YR6/6) |
| type Bongon clay | A | R1644 | olive (5Y5/3) | root traces light olive gray (5Y6/2) |
| | A | R1645 | olive gray (5Y5/2) | root traces light olive gray (5Y6/2); mangans black (5Y2.5/1); joint stain yellowish brown (10YR5/8) |
| | A | R1646, R1647 | dark greenish gray (5Y4/1) | root traces very dark gray (5Y3/1); clay skins dark greenish gray (5GY4/1) |
| | Bw | R1648, R1649, R1650 | bluish gray (5G5/1) | root traces dark brown (7.5YR3/2); mottles brown to dark brown (7.5YR4/2) |
| | C | R1651, R1652, R1653 | olive gray (5Y3/2) | shale interbeds dark olive gray (5Y3/2) |
| | - | R1654, R1655 | light gray (5Y7/1) | shale interbeds light olive gray (5Y6/2) |
| Frazer clay thin surface phase | A | R1642 | olive (5Y5/3) | weathering yellowish brown (10YR5/8) |
| Bongon clay | C | R1643 | greenish gray (5GY5/1) | - |
| eroded phase | A | R1636 | olive gray (5Y5/2) | root traces dark olive gray (5Y3/2) |
| | A | R1637 | olive gray (5Y4/2) | root traces dark olive gray (5Y3/2) |
| | Bw | R1638, R1639 | dark olive gray(5Y3/2) | clay skins dark brown (7.5YR3/2); sphaerosiderite dark brown (7.5YR3/2) and dark yellowish brown (10YR4/6) |
| | C | R1640 | olive gray (5Y4/2) | joint stain dark yellowish brown (10YR4/6) |
| | - | R1641 | greenish gray (5GY5/1) | - |
| Frazer clay | A | R1632 | greenish gray (5GY5/1) | root traces dark grayish brown (2.5Y4/2) |
| | A | R1633 | gray (5Y5/1) | plant debris black (5Y2.5/1); silstone laminae gray to light gray (5Y6/1) |
| | C | R1634 | gray (5Y5/1) | joint stain reddish brown (10YR5/8) |
| | - | R1635 | greenish gray (5G6/1) | - |
| sandstone, 32.3 m | - | R1631 | greenish gray (5G6/1) | weathering rind strong brown (7.5YR5/8) |
| sandstone, 32.7 m | - | - | greenish gray (5GY6/1) | - |
| Bongon, 34.5 m | A | - | dark olive gray (5Y3/2) | root traces black (5Y2.5/2) |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|-------------------------|------|--------|----------------------------------|---|
| | Bw | - | dark greenish gray (5GY4/1) | root traces and clay skins dark olive gray (5Y3/2); mottles brown to dark brown (7.5YR4/2) |
| Frazer, 34.2 m | C | - | greenish gray (5GY6/1) | shale interbeds greenish gray (5GY5/1) |
| | A | - | greenish gray (5GY5/1) | root traces brown (7.5YR5/2) |
| | C | - | greenish gray (5GY6/1) | root traces brown (7.5YR5/2) |
| conglom., 35 m | - | - | pale brown (10YR6/3) | pebbles of red (2.5YR4/8) jasper, very pale brown (10YR7/3) tuff, and dark greenish gray (5GY4/1) and dark olive gray (5Y7/3) chert |
| sandstone, 36 m | - | - | pale brown (10YR6/3) | - |
| conglom., 37.2 m | - | - | pale brown (10YR6/3) | pebbles yellowish red (5YR4/6) jasper, olive gray (5Y4/2) chert, very pale brown (10YR7/4) tuff, and white (2.5Y8/1) vein quartz |
| sandstone, 38.2 m | - | - | pale brown (10YR6/3) | - |
| conglom., 39.5 m | - | - | pale brown (10YR6/6) | - |
| Coxs Gap section | | | | |
| siltstone, 0.3 m | - | - | gray to light gray (5Y6/1) | joint stain strong brown (7.5YR5/8) |
| sandstone, 0.5 m | - | - | white (5Y8/1) | plant debris laminae dark gray (5Y4/1) |
| sandstone, 1 m | - | - | white (5Y8/1) | - |
| sandstone, 1.3 m | - | - | light gray (5Y7/1) | siltstone interbeds gray to light gray (5Y6/1) |
| sandstone, 2 m | - | - | light gray (5Y7/1) | - |
| Birdie coal, 3.8 m | O | - | black (5Y2.5/1) | shale laminae brown (7.5YR5/2); weathering brownish yellow (10YR6/6) |
| | A | - | gray (5Y5/1) | <i>Vertebraria</i> black (5Y2.5/1) |
| | Bw | - | gray to light gray (5Y6/1) | shale interbeds dark gray (5Y4/1) |
| | C | - | light gray (5Y7/1) | - |
| sandstone, 4 m | - | - | white (5Y8/1) | - |
| sandstone, 5 m | - | - | white (5Y8/1) | - |
| Imperial, 5.8 m | A | - | dark gray (5Y4/1) | root traces very dark gray (5Y3/1); plant debris black (5Y2.5/1) |
| sandstone, 6 m | - | - | white (5Y8/1) | grains gray (5Y5/1) and light brown (7.5YR6/4); weathering rind yellow (10YR7/6) |
| sandstone, 7.3 m | - | - | gray (5Y5/1) | siltstone interbeds dark gray (5Y4/1) |
| Imperial, 7.8 m | A | - | dark gray (5Y4/1) | plant debris black (5Y2.5/1) |
| | C | - | light gray (5Y7/1) | root traces very dark gray (5Y3/1) |
| siltstone, 8.3 m | - | - | gray (5Y5/1) | shale interbeds dark gray (5Y4/1) |
| Birdie coal, 9.4 m | O | - | black (5Y2.5/1) | weathering brown (7.5YR5/4) |
| | A | - | dark gray (5Y4/1) | <i>Vertebraria</i> light brown (7.5YR6/4) |
| | Bw | - | gray (5Y5/1) | shale interbeds dark gray (5Y4/1) |
| Birdie coal, 10.8 m | O | - | black (5Y2.5/1) | shale interbeds grayish brown (10YR5/2); weathering (7.5YR5/2) |
| | A | - | light brownish gray (10YR6/2) | <i>Vertebraria</i> very dark grayish brown (10YR3/2) |
| sandstone, 11 m | - | - | light gray (5Y7/1) | - |
| sandstone, 12.5 m | - | - | light gray (5Y7/1) | - |
| sandstone, 14 m | - | - | light gray (5Y7/1) | - |
| siltstone, 14.5 m | - | - | dark gray (5Y4/1) | sandstone interbeds light gray to gray (5Y6/1) |
| sandstone, 15 m | - | - | light gray (5Y7/1) | - |
| sandstone, 16 m | - | - | light gray (5Y7/1) | weathering yellowish brown (10YR5/6) |
| sandstone, 17 m | - | - | white (5Y8/1) | weathering yellowish brown (10YR5/6) |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|-------------------|------|--------|-------------------------------|--|
| siltstone, 17.3 m | - | - | gray to light gray (5Y6/1) | shale interbeds gray (5Y5/1) |
| sandstone, 17.6 m | - | - | white (5Y8/1) | weathering yellowish brown (10YR5/6) |
| Birdie coal, 20 m | O | - | black (5Y2.5/1) | claystone interbeds brown (7.5YR5/4); weathering light brown (7.5YR5/4) |
| | A | - | white (5Y8/2) | <i>Vertebraria</i> brown (7.5YR5/2); interbeds of shale light gray (2.5Y7/2); weathering pinkish gray (7.5YR6/2) |
| | Bw | - | light brownish gray (2.5Y6/2) | - |
| | Bw | - | gray (5Y5/1) | fossil logs black (5Y2.5/1) |
| | Bw | - | light brownish gray (2.5Y7/2) | weathering light brown (7.5YR6/4) |
| | Bw | - | light gray (5Y7/1) | laminae dark grayish brown (10YR4/4) |
| | Bw | - | gray (5Y7/1) | - |
| | C | - | white (5Y8/1) | plant debris very dark gray (5Y3/1) |
| sandstone, 20.2 m | - | - | light gray (5Y7/1) | siltstone interbeds gray (5Y5/1); quartz pebbles white (5Y8/1); weathering light yellowish brown (10YR6/4) |
| Frazer, 20.6 m | A | - | gray (5Y5/1) | root traces black (5Y2.5/1) |
| siltstone, 20.7 m | - | - | gray to light gray (5Y6/1) | fossil leaves black (5Y2.5/1) |
| sandstone, 21 m | - | - | light gray (5Y7/1) | plant debris black (5Y2.5/1) |
| Frazer, 21.7 m | A | - | gray (5Y5/1) | root traces black (5Y2.5/1); laminae gray to light gray (5Y6/1) |
| | C | - | gray (5Y5/1) | weathering rind reddish brown (5YR4/3) |
| sandstone, 21.8 m | - | - | light gray (5Y7/1) | weathering brownish yellow (10YR6/6) and brown (7.5YR5/4) |
| shale, 22 m | - | - | dark gray (5Y4/1) | - |
| sandstone, 22.3 m | - | - | light gray (5Y7/1) | weathering yellow (2.5Y7/6) |
| siderite, 22.4 m | - | - | strong brown (7.5YR4/6) | - |
| shale, 22.5 m | - | - | dark gray (5Y4/1) | - |
| siltstone, 22.6 m | - | - | light gray (5Y7/1) | - |
| shale, 22.7 m | - | - | gray to light gray (5Y6/1) | plant debris black (5Y2.5/1) |
| Frazer, 23.2 m | A | - | gray (5Y5/1) | root traces very dark gray (5Y2.5/1) |
| | C | - | light gray (5Y7/1) | clay drapes on ripples gray to light gray (5Y6/1); weathering yellow (2.5Y7/6) |
| conglom., 23.4 m | - | - | light gray (2.5Y7/2) | pebbles reddish brown (5YR5/3) jasper, dark brown (7.5YR3/2) chert, white (2.5Y8/1) tuff and olive gray (5Y5/2) volcanic |
| conglom., 24 m | - | - | light gray (2.5Y7/2) | - |
| sandstone, 24.6 m | - | - | light gray (2.5Y7/1) | weathering yellow (2.5Y7/6) |
| conglom., 24.8 m | - | - | light gray (2.5Y7/1) | - |
| sandstone, 25 m | - | - | light gray (2.5Y7/1) | - |
| sandstone, 25.5 m | - | - | light gray (5Y7/1) | - |
| siltstone, 25.9 m | - | - | gray to light gray (5Y6/1) | - |
| sandstone, 26 m | - | - | light gray (5Y7/1) | - |
| siltstone, 26.3 m | - | - | gray to light gray (5Y6/1) | - |
| Frazer, 26.7 m | A | - | light olive gray (5Y6/2) | weathering yellowish brown (2.5Y6/4) |
| | C | - | olive gray (5Y5/2) | root traces dark grayish brown (10YR4/2) |
| | C | - | light gray (5Y7/1) | - |
| conglom., 26.9 m | - | - | light gray (5Y7/1) | - |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|--------------------|------|--------------|------------------------------|--|
| sandstone, 27.1 m | - | - | light gray (5Y7/1) | - |
| conglom., 27.5 m | - | - | light gray (2.5Y7/1) | pebbles of red (2.5YR4/6) jasper, grayish green (5G5/2) chert, white (2.5Y8/1) tuff, and olive gray (5Y5/2) volcanics |
| conglom., 28.5 m | - | - | light gray (2.5Y7/1) | - |
| siltstone, 28.8 m | - | - | gray to light gray (5Y6/1) | sandstone interbeds light gray (5Y7/1) |
| Bongon, 30 m | A | - | dark gray (5Y5/1) | root traces dark olive gray (5Y3/2) |
| | Bw | - | olive gray (5Y5/2) | mottles brown (7.5YR5/2) |
| | C | - | olive gray (5Y4/2) | laminae gray (5Y5/1) |
| Kerrabee, 30.5 m | A | - | olive gray (5Y5/2) | root traces dark olive gray (5Y3/2) |
| | C | - | reddish gray (5YR6/2) | siltstone interbeds olive gray (5Y6/2) |
| Kerrabee, 30.7 m | A | - | dark gray (5Y4/1) | grades up to shale gray (5Y5/1) |
| | C | - | reddish brown (5YR4/4) | sphaerosiderite gray (5YR5/1), weathering strong brown (7.5YR5/8); root haloes olive gray (5Y5/2) and strong brown (7.5YR5/6); manganese stain black (5Y2.5/1) |
| siltstone, 30.8 m | - | - | gray (5YR5/1) | - |
| shale, 30.9 m | - | - | very dark gray (5Y3/1) | - |
| siltstone, 31 m | - | - | light gray (5Y7/2) | plant debris black (5Y2.5/2); weathering pinkish gray (7.5YR7/2) |
| sandstone, 31.4 m | - | - | light gray (5Y7/1) | - |
| sandstone, 31.5 m | - | - | light gray (5Y7/1) | siltstone interbeds gray (5Y5/1) |
| Kerrabee, 31.8 m | A | - | light olive gray (5Y6/2) | mottles dusky red (2.5YR3/2) |
| | C | - | dusky red (2.5YR3/2) | mottled light olive gray (5Y6/2) |
| type Kerrabee clay | A | R1626 | weak red (10R5/2) | drab-haloed root traces olive gray 5Y5/2); nodules reddish brown (5YR4/3) |
| | Co | R1627, R1628 | weak red (10R6/2) | root traces light brownish gray (2.5Y6/2), burrows reddish brown (5YR4/3) |
| | C | R1629, R1630 | light gray (5Y7/1) | manganese dendrites black (5Y2.5/1); weathering brown (7.5YR5/4) |
| type Wollemi clay | A | R1622 | reddish brown (5YR4/3) | drab-haloed root traces light olive gray (5Y6/2) |
| | Bw | R1623, R1624 | dusky red (10R3/2) | drab-haloed root traces light olive gray (5Y6/2) |
| | Cg | R1625 | weak red (10R5/2) | sphaerosiderite reddish black (10R2.5/1) |
| type Cox clay | A | R1617, R1618 | dark grayish brown (2.5Y4/2) | root traces and plant debris black (5Y2.5/1) |
| | AB | R1619 | grayish brown (2.5Y5/2) | root traces very dark grayish brown (2.5Y3/2) |
| | Bg | R1620 | weak red (10R4/2) | mottles light olive gray (5Y6/2); manganese dendrites black (5Y2.5/1) |
| | C | R1621 | weak red (10R4/2) | manganese dendrites black (5Y2.5/1) |
| siltstone, 34 m | - | R1616 | light gray (5Y7/1) | shale interbeds dark gray (5Y4/1); sideritic layers weathering to brown (7.5YR5/2) |
| sandstone, 34.4 m | - | - | gray to light gray (5Y6/1) | siltstone interbeds light olive (5Y6/4); mottles weak red (10R4/2); manganese dendrites black (5Y2.5/1) |
| Cox, 34.8 m | A | - | very dark gray (5Y3/1) | - |
| | Bg | - | dusky red (2.5YR3/2) | drab-haloed root traces light olive gray (5Y6/2) |
| Kerrabee, 35.3 m | A | - | weak red (10R4/2) | root traces light olive gray (5Y6/2) |
| | C | - | light gray (5Y7/2) | pebbles dark gray (5Y4/1) shale, dark grayish brown (10YR4/2), and pink (7.5YR7/4) tuff |
| Cox, 35.9 m | A | - | very dark gray (5Y3/1) | root traces black (5Y2.5/1) |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|---------------------------------|------|--------|-------------------------------|--|
| | Bg | - | weak red (10R4/2) | root traces pale yellow (2.5Y6/4), with haloes of light gray (5Y6/2) |
| | C | - | light gray (5Y7/1) | manganese dendrites black (5Y2.5/1); laminae dark gray (5Y3/1) |
| sandstone, 36 m | - | - | light gray (5Y7/2) | siltstone interbeds gray (5Y5/1) |
| Cox , 36.9 m | A | - | dark grayish brown (2.5Y4/2) | silty areas light olive gray (5Y6/2) |
| | Bg | - | weak red (10R3/2) | - |
| siltstone, 37 m | - | - | gray to light gray (5Y6/1) | - |
| Wollemi, 38.5 m | A | - | dark reddish brown (5YR3/3) | drab-haloed root traces (light olive gray (5Y6/2); concretions dark red (2.5YR3/6) |
| | Bw | - | dark reddish brown (5YR3/3) | concretions dark red (2.5YR3/6); manganese nodules black (5YR5/1) |
| Kerrabee, 39.5 m | A | - | weak red (10R4/3) | drab-haloed root traces light olive gray (5Y6/2) |
| | C | - | light olive gray (5Y6/2) | shale interbeds dusky red (10R3/3) |
| Kerrabee, 39.9 m | A | - | weak red (10R4/3) | drab-haloed root traces light olive gray (5Y6/2) |
| | C | - | light gray (5Y7/1) | - |
| Wollemi, 40.5 m | A | - | dusky red (2.5YR3/2) | drab-haloed root traces olive gray (5Y5/2) |
| | Bw | - | weak red (10R4/2) | mottles dark greenish gray (5GY4/1) |
| Cox, 41.2 m | A | - | dark gray (5Y4/1) | - |
| | Bw | - | weak red (10R4/2) | drab-haloed root traces olive gray (5Y5/2) |
| | Cg | - | light gray (5Y7/1) | siltstone interbeds weak red (10R4/2), drab-haloed root traces light olive gray (5Y6/2) |
| sandstone, 41.4 m | - | - | light gray (5Y7/1) | siltstone interbeds gray to light gray (5Y6/1) |
| Wollemi, 42.2 m | A | - | dark reddish brown (2.5YR3/4) | drab-haloed root traces light olive gray (5Y6/2); clay skins and mottles (weak red (10R4/3) |
| | Bw | - | weak red (10R4/2) | drab-haloed root traces light gray (5Y7/2) |
| sandstone, 42.3 m | - | - | light gray (2.5Y7/2) | - |
| Cox, 42.9 m | A | - | very dark gray (5Y3/1) | - |
| | AB | - | olive gray (5Y5/2) | - |
| | Bg | - | weak red (10R4/2) | drab-haloed root traces light gray (5Y7/1); concretions yellowish brown (10YR5/6); manganese spots black (5Y2.5/1) |
| sandstone, 43 m | - | - | light gray (5Y3/1) | - |
| Murrays run bore section | | | | |
| shale, 777 m | - | - | black (5Y2.5/1) | - |
| shale, 776 m | - | - | black (5Y2.5/1) | - |
| paleosol, 775 m | A | - | light gray (5Y7/2) | root traces and mottles dusky red (2.5YR3/2) |
| | C | - | gray (5Y5/1) | - |
| shale, 774 m | - | - | black (5Y2.5/1) | - |
| shale, 773 m | - | - | black (5Y2.5/1) | - |
| shale, 772 m | - | - | black (5Y2.5/1) | - |
| Imperial, 769.3 m | A | - | dark grayish brown (2.5Y4/2) | root traces including <i>Vertebraria</i> black (5Y2.5/1) |
| | C | - | black (5Y2.5/1) | - |
| shale, 769 m | - | - | dark gray (5Y4/1) | - |
| Imperial, 768.2 m | A | - | dark grayish brown (2.5Y4/2) | <i>Vertebraria</i> black (5Y2.5/1) |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|-------------------|------|--------|----------------------------|--|
| shale, 767.7 m | - | - | black (5Y2.5/1) | - |
| Imperial, 767.2 m | A | - | very dark gray (2.5Y3/1) | - |
| shale, 766.8 m | - | - | black (5Y2.5/1) | siltstone interbeds gray to light gray (5Y6/1) |
| shale, 766 m | - | - | black (5Y2.5/1) | - |
| Imperial, 765.2 m | A | - | very dark gray (5Y3/1) | <i>Vertebraria</i> black (5Y2.5/1) |
| | C | - | very dark gray (5Y3/1) | - |
| shale, 765.2 m | - | - | very dark gray (5Y3/1) | - |
| Birdie at 764.2 m | O | - | black (5Y2.5/1) | - |
| | A | - | very dark gray (5Y3/1) | <i>Vertebraria</i> black (5Y2.5/1) |
| | Bw | - | very dark gray (2.5Y3/1) | - |
| Birdie at 758.2 m | O | - | black (5Y2.5/1) | - |
| | A | - | black (5Y2.5/1) | - |
| | Bw | - | black (5Y2.5/1) | - |
| | C | - | gray to light gray (5Y6/1) | shale interbeds black (5Y2.5/1) |
| sandstone, 758 m | - | - | light gray (2.5Y7/2) | siltstone interbeds gray (5Y5/1) |
| sandst., 757.5 m | - | - | white (5Y8/1) | claystone clasts dark gray (5Y7/1), plant debris black (5Y2.5/1) |
| sandst., 756.3 m | - | - | white (5Y8/1) | - |
| sandst., 755.7 m | - | - | white (5Y8/1) | laminae very dark gray (5Y3/1) |
| sandst., 755 m | - | - | white (5Y8/1) | fossil logs black (5Y2.5/1) |
| paleosol, 754.2 m | - | - | gray (5Y5/2) | - |
| sandst., 753.7 | - | - | white (5Y8/1) | - |
| sandst., 753 m | - | - | gray (5Y5/1) | - |
| sandst., 752.3 m | - | - | white (5Y8/1) | claystone clasts dark gray (5Y4/1) |
| sandst., 750.7 m | - | - | gray to light gray (5Y6/1) | - |
| sandst., 749.8 m | - | - | white (5Y8/1) | - |
| sandst., 748.7 m | - | - | light gray (5Y7/2) | - |
| sandst., 747.5 m | - | - | gray to light gray (5Y6/1) | - |
| shale, 746.8 m | - | - | dark gray (5Y4/1) | - |
| sandst., 746.5 m | - | - | white (5Y8/1) | - |
| shale, 745.5 m | - | - | gray (5Y5/1) | - |
| sandst., 745.4 m | - | - | white (5Y8/1) | - |
| shale, 744.8 m | - | - | very dark gray (5Y3/1) | - |
| Imperial, 744.4 m | A | - | very dark gray (5Y3/1) | root traces black (5Y2.5/1) |
| | C | - | light gray (5Y7/2) | - |
| shale, 744 m | - | - | very dark gray (5Y3/1) | - |
| Imperial, 742.3 m | A | - | very dark gray (5Y3/1) | - |
| | C | - | very dark gray (5Y3/1) | - |
| shale, 742 m | - | - | dark gray (5Y4/1) | - |
| shale, 741 m | - | - | very dark gray (5Y3/1) | - |
| shale, 740 m | - | - | black (5Y2.5/1) | - |
| shale, 739.2 m | - | - | very dark gray (5Y3/1) | - |
| shale, 738.8 m | - | - | black (5Y2.5/1) | - |
| Wybung, 737.6 m | A | - | gray (5Y5/1) | root traces very dark gray (5Y3/1) |
| | Bw | - | dark gray (5Y4/1) | - |
| Frazer, 737.2 m | A | - | gray (5Y5/1) | - |
| | C | - | light gray (5Y7/1) | mottles very pale brown (10YR7/3) |
| sandstone, 737 m | - | - | light gray (5Y7/1) | - |
| sandst., 736.6 m | - | - | light gray (5Y7/1) | - |
| Frazer, 735.9 m | A | - | dark gray (5Y4/1) | root traces very dark gray (5Y3/1) |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|--------------------|------|--------|----------------------------|---|
| | C | - | gray (5Y5/1) | - |
| siltstone, 735.8 m | - | - | gray (5Y5/1) | - |
| Bongon, 734.8 m | A | - | gray to dark gray (5Y6/1) | - |
| | Bw | - | gray (5Y5/1) | mottles brown (7.5YR5/4) |
| sandst., 734.5 m | - | - | white (5Y8/1) | laminae very dark gray (5Y3/1) |
| shale, 734.2 m | - | - | gray (5Y5/1) | - |
| Bongon, 733.3 m | A | - | dark gray (5Y4/1) | - |
| | Bw | - | gray (5Y5/1) | mottles reddish brown (5YR4/3) |
| | C | - | light gray (5Y7/2) | - |
| siltstone, 733.2 m | - | - | light gray (5Y7/2) | shale interbeds very dark gray (5Y3/1) |
| Frazer, 731.9 m | A | - | gray (5Y5/1) | root traces dark gray (5Y4/1) |
| | C | - | light gray (5Y7/2) | - |
| siltstone, 731.5 m | - | - | gray to light gray (5Y6/1) | - |
| shale, 731.3 m | - | - | dark gray (5Y4/1) | - |
| Frazer, 730.8 m | A | - | gray to light gray (5Y6/1) | - |
| | C | - | gray (5Y5/1) | - |
| Bongon, 730.1 m | A | - | gray (5Y5/1) | - |
| | Bw | - | gray to light gray (5Y6/1) | mottles reddish brown (5YR4/3) |
| sandstone, 730 m | - | - | light gray (5Y7/1) | laminae very dark gray (5Y3/1) |
| Frazer, 729.2 m | A | - | dark gray (5Y4/1) | - |
| | C | - | gray (5Y5/1) | - |
| sandstone, 729 m | - | - | white (5Y8/1) | claystone clasts dark gray (5Y4/1) |
| Frazer, 728.6 m | A | - | dark gray (5Y4/1) | - |
| sandst., 728.5 m | - | - | white (5Y8/1) | - |
| Frazer, 726.8 m | A | - | gray (5Y5/1) | root traces black (5Y2.5/1) |
| | C | - | white (5Y8/1) | laminae very dark gray (5Y3/1) |
| sandst., 726.5 m | - | - | light gray (5Y7/2) | grains reddish yellow (7.5YR6/6) |
| sandst., 726 m | - | - | gray (5Y5/1) | laminae very dark gray (5Y3/1) |
| sandst., 725.5 m | - | - | light gray (5Y7/2) | - |
| sandst., 724.8 m | - | - | light gray (5Y7/2) | - |
| Bongon, 723.8 m | A | - | dark gray (5Y6/1) | - |
| | Bw | - | gray to light gray (5Y6/1) | - |
| | C | - | light gray (5Y7/2) | mottles reddish brown (5YR4/3), stain reddish yellow (7.5YR6/6) |
| Bongon, 723.2 m | A | - | dark gray (5Y4/1) | - |
| | Bw | - | gray (5Y5/1) | mottles dark reddish brown (5YR3/3) |
| | C | - | gray (5Y5/1) | laminae gray to light gray (5Y6/1) |
| Frazer, 722.4 m | A | - | dark gray (5Y4/1) | - |
| | C | - | light olive gray (5Y6/2) | - |
| shale, 722.3 m | - | - | very dark gray (5Y3/1) | siltstone interbeds gray to light gray (5Y6/1) |
| Bongon, 721.6 m | A | - | dark gray (5Y4/1) | - |
| | Bw | - | gray (5Y5/1) | mottles reddish brown (5YR4/4) |
| | C | - | light gray (5Y7/2) | - |
| Bongon, 720.6 m | A | - | dark gray (5Y4/1) | root traces very dark gray (5Y3/1) |
| | Bw | - | gray (5Y5/1) | mottles reddish brown (5YR4/3) |
| | C | - | gray (5Y5/1) | shale laminae dark gray (5Y4/1) |
| sandst., 720.5 m | - | - | white (5Y8/1) | - |
| sandst., 719.8 m | - | - | white (5Y8/1) | - |
| shale, 719.5 m | - | - | dark gray (5Y4/1) | - |
| sandst., 719.2 m | - | - | light gray (5Y7/2) | - |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|-------------------------------|------|--------|-------------------------------|---|
| shale, 719 m | - | - | gray (5Y5/1) | - |
| Frazer, 718.2 m | A | - | very dark gray (5Y3/1) | - |
| | C | - | gray to light gray(5Y6/1) | - |
| Bongon, 717.5 m | A | - | dark gray (5Y4/1) | - |
| | Bw | - | gray to light gray (5Y6/1) | mottles reddish brown (5YR4/3) |
| | C | - | gray to light gray (5Y6/1) | - |
| Frazer, 717.2 m | A | - | light olive gray (5Y6/2) | - |
| Bongon, 716.6 m | A | - | gray (5Y5/1) | - |
| | Bw | - | gray (5Y5/1) | mottles (5YR4/3) |
| | C | - | gray to light to gray (5Y6/1) | shale interbeds gray (5Y5/1) |
| siltstone, 716.5 m | - | - | dark gray (5Y4/1) | - |
| Bongon, 715.6 m | A | - | gray (5Y5/1) | - |
| | Bw | - | gray (5Y5/1) | mottled reddish brown (5YR4/3) |
| Bunnerong bore section | | | | |
| sandst., 824.5 m | - | - | bluish gray (5B6/1) | - |
| siltstone, 824 m | - | - | dark gray (5Y4/1) | shale interbeds very dark gray (5Y3/1) |
| sandst., 823.6 m | - | - | bluish gray (5B6/1) | - |
| conglom., 823 m | - | - | bluish gray (5G6/1) | pebbles grayish green (5G5/2) and bluish gray (5B6/1) volcanics, dark gray (5Y4/1) chert, and white (5Y8/2) vein quartz |
| sandst., 822.5 m | - | - | gray (5Y5/1) | laminae black 5Y4/1) |
| shale, 821.5 m | - | - | dark gray (5Y4/1) | - |
| sandstone, 821 m | - | - | greenish gray (5G6/1) | - |
| shale, 820.5 m | - | - | dark gray (5Y4/1) | - |
| sandstone, 820 m | - | - | greenish gray (5G6/1) | - |
| siltstone, 819.4 m | - | - | gray (5Y5/1) | shale interbeds dark gray (5Y4/1) |
| shale, 819.2 m | - | - | dark gray (5Y4/1) | siltstone interbeds gray (5Y5/1) |
| Birdie, 816.6 m | O | - | black (5Y2.5/1) | - |
| | A | - | black (5Y2.5/1) | - |
| | Bw | - | dark gray (5Y4/1) | <i>Vertebraria</i> black (5Y2.5/1) |
| | C | - | gray (5Y5/1) | - |
| breccia, 816.5 m | - | - | gray (5Y5/1) | clasts of coal black (5Y2.5/1) and of shale very dark gray (5Y3/1) |
| sandst., 816.4 m | - | - | greenish gray (5GY6/1) | - |
| sandst., 816.2 m | - | - | gray (5Y5/1) | clay-filled burrows dark gray (5Y4/1) |
| sandst., 815.8 m | - | - | greenish gray (5GY6/1) | laminae black (5Y2.5/1) |
| conglom., 815.3 m | - | - | light gray (5Y7/2) | pebbles gray (5Y5/1)and greenish gray (5GY6/1) volcanics and white (5Y8/2) vein quartz |
| siltstone, 815.2 | - | - | gray to light gray (5Y6/1) | laminae back (5Y2.5/1) |
| conglom., 815 m | - | - | light gray (5Y7/2) | - |
| conglom., 814.1 m | - | - | light gray (5Y7/2) | - |
| conglom., 813.5 m | - | - | light gray (5Y7/2) | - |
| sandstone, 813 m | - | - | gray to light gray (5Y6/1) | - |
| sandstone, 812 m | - | - | gray to light gray (5Y6/1) | - |
| siltstone, 811.8 m | - | - | gray (5Y5/1) | laminae of black (5Y2.5/1) |
| sandst., 811.5 m | - | - | gray to light gray (5Y6/1) | shale laminae very dark gray (5Y3/1); plant chaff black (5Y2.5/1) |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|--------------------|------|--------|------------------------|--|
| Birdie, 804.8 m | O | - | black (5Y2.5/1) | dolerite intrusion light greenish gray (5GY7/1) with chilled margin white (5GY8/1) |
| | A | - | very dark gray (5Y3/1) | <i>Vertebraria</i> black (5Y2.5/1) |
| | Bw | - | gray (5Y5/1) | shale interbeds very dark gray (5Y3/1) |
| | C | - | gray (5Y5/1) | laminae black (5Y2.5/1) |
| Frazer, 804.3 m | A | - | very dark gray (5Y3/1) | root traces black (5Y2.5/1) |
| | C | - | very dark gray (5Y3/1) | laminae dark gray (5Y4/1) |
| siltstone, 804 m | - | - | gray (5Y5/1) | shale interbeds dark gray (5Y4/1) |
| sandst., 803.5 m | - | - | greenish gray (5GY5/1) | - |
| Frazer, 803.1 m | A | - | dark gray (5Y4/1) | - |
| | C | - | gray (5Y5/1) | - |
| siltstone, 803 m | - | - | dark gray (5Y4/1) | - |
| shale, 802.8 m | - | - | very dark gray (5Y4/1) | - |
| Frazer, 801.9 m | A | - | gray (5Y5/1) | root traces black (5Y2.5/1) |
| | C | - | gray (5Y5/1) | - |
| Frazer, 801.2 m | A | - | dark gray (5Y4/1) | root traces black (5Y2.5/1) |
| | C | - | gray (5Y5/1) | shale (5Y5/1) |
| sandstone, 801 m | - | - | greenish gray (5GY6/1) | - |
| conglom., 800.6 m | - | - | greenish gray (5GY6/1) | clasts of sideritic claystone grayish brown (10YR5/2) and shale dark gray (5Y4/1); granules of greenish gray (5GY5/1) volcanics and white (5Y8/2) quartz |
| conglom., 800 m | - | - | greenish gray (5GY6/1) | - |
| sandst., 799.5 m | - | - | greenish gray (5GY6/1) | - |
| sandst., 798 m | - | - | greenish gray (5GY6/1) | - |
| conglom., 797.7 m | - | - | greenish gray (5GY6/1) | - |
| sandstone, 797 m | - | - | greenish gray (5GY6/1) | log black (5Y2.5/1) and dark grayish brown (10YR4/2) |
| conglom., 796.8 m | - | - | greenish gray (5GY6/1) | - |
| sandst., 795.5 m | - | - | greenish gray (5GY6/1) | - |
| sandst., 794.5 m | - | - | greenish gray (5GY6/1) | - |
| sandst., 794.8 m | - | - | greenish gray (5GY6/1) | - |
| shale, 794.5 m | - | - | gray (5Y5/1) | - |
| sandst., 794.5 m | - | - | greenish gray (5GY6/1) | - |
| sandst., 794.3 m | - | - | greenish gray (5GY6/1) | granules gray (5Y5/1) chert, greenish gray (5GY5/1) volcanic and white (5Y8/2) quartz pebble |
| sandstone, 792 m | - | - | greenish gray (5GY6/1) | - |
| sandst., 790.5 m | - | - | greenish gray (5GY6/1) | - |
| sandst., 789.5 m | - | - | greenish gray (5GY6/1) | - |
| siltstone, 788.6 m | - | - | dark gray (5Y4/1) | - |
| siltstone, 788.5 m | - | - | gray (5Y5/1) | - |
| siltstone, 788.3 m | - | - | dark gray (5Y4/1) | - |
| Bongon, 787.2 m | A | - | dark gray (5Y4/1) | - |
| | A | - | gray (5Y5/1) | slickensides and root traces dark gray (5Y4/1) |
| | Bw | - | gray (5Y4/1) | mottles yellowish brown (10YR5/6) |
| | C | - | gray (5Y5/1) | - |
| Frazer, 786.5 m | A | - | gray (5Y5/1) | root traces very dark gray (5Y3/1) |
| | C | - | gray (5Y5/1) | shale interbeds very dark gray (5Y3/1) |
| sandst., 786.2 m | - | - | greenish gray (5GY6/1) | siderite clasts grayish brown (5Y5/2) |
| sandst., 784.7 m | - | - | greenish gray (5GY6/1) | - |
| Bongon, 783.9 m | A | - | very dark gray (5Y4/1) | root traces very dark gray (5Y4/1) |

APPENDIX 3. Munsell colors continued

| Paleosol | Hoz. | Spem.# | Fresh Color | Minor Colors |
|--------------------|------|--------|----------------------------|---|
| | Bw | - | greenish gray (5GY5/1) | mottles dark grayish brown (10YR4/2) |
| | C | - | dark gray (5Y4/1) | mottles dark grayish brown (10YR4/2) |
| siltstone, 783.8 m | - | - | grayish brown (2.5Y5/2) | - |
| shale, 783.7 m | - | - | dark gray (5Y4/1) | - |
| Frazer, 783.2 m | A | - | gray to light gray (5Y6/1) | slickensides and root traces dark gray (5Y4/1) |
| | C | - | greenish gray(5GY6/1) | - |
| sandstone, 783 m | - | - | greenish gray (5GY6/1) | - |
| shale, 782.9 m | - | - | gray (5Y5/1) | - |
| Frazer, 782.5 m | A | - | gray (5Y5/1) | root traces dark gray (5Y4/1) |
| | C | - | greenish gray (5GY5/1) | - |
| Bongon, 781.9 m | A | - | greenish gray (5GY5/1) | root traces and slickensides dark gray (5Y4/1); mottles dark greenish gray (5GY4/1) |
| | Bw | - | gray (5Y5/1) | slickensides and mottles dark grayish brown (10YR4/2) |
| | C | - | greenish gray (5GY5/1) | - |
| sandst., 781.9 m | - | - | greenish green (5GY6/1) | - |
| conglom., 781.5 m | - | - | greenish gray (5GY6/1) | granules greenish gray (5GY6/1) volcanics, white (5GY8/2) vein quartz, and bluish gray (5B5/1) and gray (5Y5/1) chert |
| Frazer, 781.1 m | A | - | dark gray (5Y4/1) | root traces and slickensides very dark gray (5Y3/1) |
| siltstone, 781 m | - | - | gray to light gray (5Y6/1) | - |

Note: All colors were taken using a Munsell Color (1975) chart on rock samples within minutes of excavation. Paleosols are listed in stratigraphic order.

APPENDIX 4. Textures (volume percent) from point counting petrographic thin sections and calcareousness from reaction with dilute acid of Permian and Triassic paleosols of the Sydney Basin, Australia.

| Paleosol | Horizon | Spem. # R- | Calcar- eous- ness | Percent Clay | Percent Silt | Percent Sand | Percent Gravel | Texture |
|--|---------|---------------|--------------------------|-----------------|-----------------|-----------------|-------------------|--------------------|
| type Imperial clay | A | 1699 | 1 | 52.6 | 20.6 | 26.8 | 0 | clay |
| | C | 1700 | 1 | 54.0 | 30.8 | 15.2 | 0 | clay |
| | - | 1701 | 1 | 69.6 | 13.0 | 17.4 | 0 | clay |
| | - | 1702 | 1 | 69.0 | 16.0 | 15.0 | 0 | clay |
| type Birdie coal | O | 1668 | 1 | 2.0 | 11.6 | 67.2 | 19.2 | loamy sand |
| | O | 1669 | 1 | 0.8 | 16.8 | 77.0 | 5.4 | loamy sand |
| | O | 1670 | 1 | 1.0 | 10.8 | 77.2 | 11.0 | sand |
| | A | 1671 | 1 | 68.8 | 20.0 | 11.2 | 0 | clay |
| | A | 1672 | 1 | 57.8 | 27.6 | 14.6 | 0 | clay |
| | A | 1673 | 1 | 49.2 | 21.8 | 29.0 | 0 | clay |
| | C | 1674 | 1 | 50.6 | 30.0 | 19.4 | 0 | clay |
| | C | 1675 | 1 | 55.4 | 18.2 | 26.4 | 0 | clay |
| | C | 1676 | 1 | 27.2 | 25.0 | 47.8 | 0 | sandy clay loam |
| | - | 1677 | 1 | 26.4 | 29.8 | 43.8 | 0 | loam |
| | - | 1678 | 1 | 31.8 | 27.4 | 40.8 | 0 | clay loam |
| | - | 1679 | 1 | 20.4 | 27.8 | 51.8 | 0 | loam |
| | - | 1680 | 1 | 18.8 | 10.8 | 70.4 | 0 | sandy loam |
| Birdie coal | O | 1688 | 1 | 5.8 | 25.6 | 49.2 | 19.4 | loamy sand |
| | O | 1690 | 1 | 12.0 | 24.4 | 63.0 | 0.6 | sandy loam |
| | O | 1691 | 1 | 6.8 | 22.6 | 70.6 | 0 | loamy sand |
| | A | 1695 | 1 | 57.2 | 26.0 | 16.8 | 0 | clay |
| | Bw | 1696 | 1 | 19.2 | 35.8 | 45.0 | 0 | loam |
| | Bw | 1697 | 1 | 15.8 | 29.8 | 54.4 | 0 | sandy loam |
| | C | 1698 | 1 | 14.0 | 26.2 | 59.8 | 0 | sandy loam |
| | - | 1689 | 1 | 4.4 | 21.6 | 59.6 | 14.4 | loamy sand |
| sandstone above Birdie type Wybung silty clay | A | 1662 | 1 | 43.6 | 48.6 | 7.8 | 0 | silty clay |
| | A | 1663 | 1 | 45.2 | 41.2 | 13.6 | 0 | silty clay |
| | Bw | 1664 | 1 | 45.0 | 36.6 | 18.4 | 0 | clay |
| | Bw | 1665 | 1 | 38.4 | 33.4 | 28.2 | 0 | clay loam |
| | C | 1666 | 1 | 21.2 | 12.4 | 50.1 | 16.0 | sandy clay loam |
| | C | 1667 | 1 | 29.6 | 8.8 | 30.0 | 31.6 | sandy clay loam |
| Wybung clay | A | 1682 | 1 | 70.2 | 20.6 | 9.2 | 0 | clay |
| | A | 1683 | 1 | 62.6 | 27.0 | 10.4 | 0 | clay |
| | Bw | 1684 | 1 | 36.2 | 28.8 | 35.0 | 0 | clay loam |
| | Bw | 1685 | 1 | 36.8 | 30.8 | 32.4 | 0 | clay loam |
| | C | 1686 | 1 | 28.6 | 39.4 | 32.0 | 0 | clay loam |
| | C | 1687 | 1 | 21.4 | 11.8 | 12.2 | 54.6 | sandy clay loam |

APPENDIX 4. textures continued.

| Paleosol | Horizon | Spem. # R- | Calcar- eous- ness | Percent Clay | Percent Silt | Percent Sand | Texture |
|------------------------------|---------|---------------|--------------------------|-----------------|-----------------|-----------------|---------|
| | Bw | 1623 | 1 | 68.4 | 28.2 | 3.4 | 0 clay |
| | Cg | 1624 | 1 | 59.0 | 29.0 | 12.0 | 0 clay |
| | Cg | 1625 | 1 | 60.6 | 20.4 | 19.0 | 0 clay |
| type Cox clay | A | 1617 | 1 | 70.4 | 27.4 | 2.2 | 0 clay |
| | A | 1618 | 1 | 74.0 | 21.0 | 5.0 | 0 clay |
| | AB | 1619 | 1 | 62.8 | 22.4 | 14.8 | 0 clay |
| | Bg | 1620 | 1 | 57.4 | 30.6 | 12.0 | 0 clay |
| | Bg | 1621 | 1 | 60.4 | 22.6 | 17.0 | 0 clay |
| shale above type Cox clay | - | 1616 | 1 | 78.6 | 16.2 | 5.2 | 0 clay |

Note: Sphaerosiderite was counted as sand although probably authigenic rather than clastic in origin. Relative scale of calcareousness (1-5) by reaction with 1.2M (10% of standard solution) HCl is from Retallack (1988, 1990). Standard error ($\pm 1\sigma$) of these 500-point counts is about 2 volume % (Van der Plas & Tobi 1965; Murphy 1983). Counts were made with a Swift automatic point counter by G.J. Retallack. Textures of peaty samples (all those with more than 10% organic carbon) reflect size distribution of coal macerals as well as mineral grains.

APPENDIX 5. Mineral composition (volume percent) by point counting petrographic thin sections of Permian and Triassic paleosols of the Sydney Basin, Australia.

| Paleosol | Hori- zon | Spem. # R- | Clay | Red stain | Sider- ite | Feld- spar | Mica | Rock Frag. | Clay- stone | Opa- que | Quartz |
|---|--------------|---------------|------|--------------|---------------|---------------|------|---------------|----------------|-------------|--------|
| type Imperial clay | A | 1699 | 53.2 | 0 | 0 | 1.0 | 0.8 | 41.6 | 0 | 1.8 | 1.6 |
| | C | 1700 | 15.0 | 0 | 0.6 | 3.0 | 0.8 | 64.2 | 0 | 13.0 | 3.4 |
| | - | 1701 | 18.2 | 0 | 0 | 0.4 | 1.0 | 63.4 | 0 | 4.8 | 12.2 |
| | - | 1702 | 14.8 | 0 | 0 | 0.2 | 0.2 | 65.4 | 0 | 7.0 | 12.4 |
| type Birdie | O | 1668 | 1.6 | 0 | 0 | 0 | 0 | 0.2 | 8.8 | 87.6 | 1.8 |
| | O | 1669 | 1.0 | 0 | 0 | 0 | 0 | 0.2 | 9.6 | 88.4 | 0.8 |
| | O | 1670 | 1.4 | 0 | 0 | 0 | 0 | 0.2 | 10.4 | 86.6 | 1.4 |
| | A | 1671 | 69.4 | 0 | 0 | 4.2 | 0.8 | 21.8 | 0 | 0 | 3.8 |
| | A | 1672 | 57.6 | 0 | 0 | 3.8 | 2.0 | 23.6 | 0 | 3.4 | 9.6 |
| | A | 1673 | 48.4 | 0 | 0 | 0.4 | 1.4 | 36.2 | 0 | 3.2 | 10.4 |
| | C | 1674 | 52.6 | 0 | 0 | 2.4 | 0.2 | 33.8 | 0 | 3.8 | 7.2 |
| | C | 1675 | 56.2 | 0 | 0 | 2.2 | 0.8 | 30.2 | 0 | 1.6 | 9.0 |
| | C | 1676 | 28.8 | 0 | 0 | 0.8 | 0.4 | 58.0 | 0 | 4.4 | 7.6 |
| | - | 1677 | 27.0 | 0 | 0 | 2.6 | 1.0 | 57.0 | 0 | 2.2 | 10.2 |
| | - | 1678 | 31.8 | 0 | 0 | 1.2 | 0.4 | 53.2 | 0 | 3.2 | 10.2 |
| | - | 1679 | 20.6 | 0 | 0 | 0.8 | 1.2 | 57.2 | 0 | 5.4 | 14.8 |
| Birdie coal | - | 1680 | 17.6 | 0 | 0 | 0.2 | 0.2 | 63.6 | 0 | 2.8 | 15.6 |
| | O | 1688 | 6.4 | 0 | 0 | 0.8 | 0 | 0 | 29.8 | 60.4 | 2.6 |
| | O | 1690 | 14.4 | 0 | 0 | 0 | 0 | 12.4 | 0 | 70.6 | 2.6 |
| | O | 1691 | 6.8 | 0 | 0 | 0 | 0 | 8.0 | 0 | 83.6 | 1.6 |
| | A | 1695 | 56.8 | 0 | 0 | 3.0 | 0.2 | 32.2 | 0 | 4.4 | 3.4 |
| | Bw | 1696 | 20.8 | 0 | 0 | 0.8 | 2.2 | 56.6 | 0 | 6.0 | 13.6 |
| | Bw | 1697 | 14.4 | 0 | 0 | 3.6 | 0.4 | 57.8 | 0 | 15.8 | 8.0 |
| | C | 1698 | 13.4 | 0 | 0.6 | 4.2 | 0.2 | 69.0 | 0 | 9.6 | 3.0 |
| sandstone above Birdie | - | 1689 | 4.2 | 0 | 47.4 | 0 | 0.2 | 32.4 | 0 | 12.4 | 3.4 |
| | - | 1689 | 4.2 | 0 | 47.4 | 0 | 0.2 | 32.4 | 0 | 12.4 | 3.4 |
| type Wybung silty clay | A | 1662 | 43.6 | 0 | 0 | 3.0 | 0.4 | 28.2 | 0 | 2.6 | 22.2 |
| | A | 1663 | 45.0 | 0 | 0 | 9.6 | 0 | 24.0 | 0 | 1.0 | 19.4 |
| | Bw | 1664 | 46.2 | 0 | 0 | 5.4 | 1.6 | 41.4 | 0 | 1.4 | 4.0 |
| | Bw | 1665 | 38.8 | 0 | 0 | 7.6 | 1.0 | 42.2 | 0 | 3.6 | 6.8 |
| | C | 1666 | 22.2 | 0 | 0 | 4.6 | 0 | 29.0 | 0 | 0 | 2.8 |
| | C | 1667 | 30.8 | 0 | 0 | 0.6 | 0 | 2.4 | 59.4 | 5.4 | 1.4 |
| Wybung clay | A | 1682 | 71.2 | 0 | 0 | 4.8 | 0.2 | 19.0 | 0 | 2.0 | 2.8 |
| | A | 1683 | 62.4 | 0 | 0 | 7.0 | 0 | 24.0 | 0 | 3.2 | 3.4 |
| | Bw | 1684 | 36.8 | 0 | 3.6 | 5.8 | 0.6 | 31.6 | 0 | 16.8 | 4.8 |
| | Bw | 1685 | 36.8 | 0 | 7.6 | 4.4 | 0.4 | 42.6 | 0 | 4.2 | 4.0 |
| | C | 1686 | 31.0 | 0 | 7.4 | 5.0 | 0.4 | 39.0 | 0 | 9.8 | 7.4 |
| | C | 1687 | 20.2 | 0 | 0 | 0.6 | 0 | 0 | 74.8 | 4.0 | 0.4 |
| sandstone on Wybung type Frazer clay | - | 1681 | 13.8 | 0 | 0 | 0.2 | 0 | 59.8 | 0 | 7.6 | 18.6 |
| | A | 1657 | 46.4 | 0 | 0 | 4.4 | 0.2 | 30.2 | 0 | 4.0 | 14.8 |
| | A | 1658 | 44.2 | 0 | 0 | 1.2 | 0.6 | 34.8 | 0 | 4.0 | 15.2 |
| | C | 1659 | 26.6 | 0 | 0 | 1.2 | 1.8 | 51.8 | 0 | 2.4 | 16.2 |
| | C | 1660 | 22.0 | 0 | 0 | 1.2 | 0.4 | 47.6 | 0 | 2.6 | 26.2 |

APPENDIX 5. Mineral composition continued.

| Paleosol | Hori- zon | Spem. # R- | Clay | Red stain | Sider- ite | Feld- spar | Mica | Rock Frag. | Clay- stone | Op- aque | Quartz |
|---------------------------|--------------|---------------|------|--------------|---------------|---------------|------|---------------|----------------|-------------|--------|
| | - | 1661 | 13.8 | 0 | 0 | 0 | 0 | 33.4 | 0 | 6.0 | 46.8 |
| sandst. on type Frazer | - | 1656 | 24.0 | 0 | 0 | 0 | 0.4 | 59.2 | 0 | 4.2 | 12.2 |
| type Bongon clay | A | 1644 | 66.0 | 0 | 0 | 2.8 | 0.6 | 23.6 | 0 | 1.2 | 5.8 |
| | A | 1645 | 27.6 | 0 | 0 | 2.2 | 0 | 27.6 | 0 | 8.2 | 12.0 |
| | A | 1646 | 63.8 | 0 | 0 | 6.2 | 0.8 | 22.2 | 0 | 2.4 | 4.6 |
| | Bw | 1647 | 60.8 | 0 | 0 | 4.8 | 1.0 | 25.2 | 0 | 3.2 | 5.0 |
| | Bw | 1648 | 63.6 | 0 | 0 | 12.8 | 1.0 | 11.8 | 0 | 0.8 | 10.0 |
| | Bw | 1649 | 60.6 | 0 | 0 | 7.4 | 0.2 | 19.8 | 0 | 4.0 | 8.0 |
| | C | 1650 | 53.6 | 0 | 12.4 | 6.0 | 0.2 | 20.2 | 0 | 4.4 | 3.2 |
| | C | 1651 | 49.8 | 0 | 0 | 13.8 | 1.2 | 25.6 | 0 | 1.2 | 8.4 |
| | - | 1652 | 33.0 | 0 | 0 | 4.8 | 0.8 | 53.4 | 0 | 1.6 | 6.4 |
| | - | 1653 | 38.4 | 0 | 0 | 4.0 | 0.6 | 49.4 | 0 | 0.6 | 7.0 |
| | - | 1654 | 24.6 | 0 | 0 | 0.8 | 0.6 | 59.2 | 0 | 4.4 | 10.4 |
| | - | 1655 | 8.4 | 0 | 0 | 0.2 | 0.2 | 66.4 | 0 | 10.8 | 14.0 |
| Frazer clay thin surface | A | 1642 | 56.0 | 0 | 0 | 3.8 | 0.4 | 30.6 | 0 | 1.4 | 7.8 |
| | C | 1643 | 33.2 | 0 | 0 | 0.6 | 0 | 50.2 | 0 | 5.8 | 10.2 |
| Bongon clay eroded | A | 1636 | 72.0 | 0 | 0 | 2.0 | 0.6 | 16.6 | 0 | 4.4 | 4.4 |
| | A | 1637 | 55.2 | 0 | 0 | 2.4 | 0.8 | 27.0 | 0 | 5.4 | 9.2 |
| | A | 1638 | 62.4 | 0 | 0 | 12.8 | 0 | 15.8 | 0 | 3.4 | 5.6 |
| | Bw | 1639 | 59.8 | 0 | 0 | 4.4 | 0.4 | 24.8 | 0 | 2.8 | 7.8 |
| | C | 1640 | 51.2 | 0 | 0 | 5.8 | 0.6 | 35.0 | 0 | 0.6 | 6.8 |
| | C | 1641 | 51.2 | 0 | 0 | 1.6 | 0 | 32.8 | 0 | 5.0 | 9.4 |
| Frazer clay | A | 1632 | 55.0 | 2.4 | 0 | 0.8 | 0 | 33.4 | 0 | 4.2 | 4.2 |
| | A | 1633 | 59.0 | 0 | 0 | 4.4 | 0.2 | 30.0 | 0 | 4.8 | 1.6 |
| | C | 1634 | 56.6 | 0 | 0 | 3.8 | 0.8 | 31.2 | 0 | 3.2 | 4.4 |
| | C | 1635 | 20.8 | 0 | 0 | 1.6 | 0.4 | 60.4 | 0 | 5.2 | 11.6 |
| sandstone on Frazer clay- | | 1631 | 40.2 | 0 | 0 | 1.8 | 1.0 | 41.0 | 0 | 7.6 | 8.4 |
| type Kerrabee clay | A | 1626 | 63.4 | 0 | 0.2 | 1.8 | 0 | 15.2 | 0 | 18.6 | 0.8 |
| | A | 1627 | 45.4 | 0 | 0 | 0.8 | 0.2 | 30.4 | 0 | 17.2 | 6.0 |
| | C | 1628 | 46.4 | 0 | 0 | 0.4 | 0.4 | 27.6 | 0 | 19.8 | 5.4 |
| | C | 1629 | 46.4 | 0 | 0 | 3.6 | 0.8 | 5.8 | 0 | 34.8 | 8.6 |
| | - | 1630 | 35.4 | 0 | 0 | 0.6 | 0.6 | 39.0 | 0 | 12.8 | 11.6 |
| type Wollemi clay | A | 1622 | 75.2 | 0 | 0 | 1.8 | 0 | 6.4 | 0 | 8.8 | 6.0 |
| | Bw | 1623 | 70.4 | 0 | 0 | 5.8 | 1.0 | 10.2 | 0 | 6.6 | 6.0 |
| | Cg | 1624 | 60.8 | 0 | 0 | 3.0 | 0.2 | 9.6 | 0 | 24.4 | 2.0 |
| | Cg | 1625 | 61.0 | 0 | 6.4 | 2.6 | 0.6 | 11.2 | 0 | 16.2 | 2.0 |
| type Cox clay | A | 1617 | 71.2 | 0 | 0 | 8.4 | 13.8 | 0.2 | 0 | 0.6 | 5.8 |
| | A | 1618 | 74.8 | 0 | 0 | 3.6 | 2.4 | 8.4 | 0 | 2.2 | 8.6 |
| | AB | 1619 | 61.4 | 0 | 0 | 1.0 | 0 | 12.2 | 0 | 22.8 | 2.6 |
| | Bg | 1620 | 59.2 | 0 | 0 | 0.8 | 1.8 | 12.4 | 0 | 20.0 | 5.8 |
| | Bg | 1621 | 61.0 | 0 | 0 | 3.0 | 0.8 | 16.0 | 0 | 16.0 | 1.6 |
| shale on type Cox clay | - | 1616 | 65.2 | 14.8 | 0 | 0.8 | 0 | 9.0 | 0 | 9.0 | 1.2 |

Note: Paleosol names and error as for App. 3. Mica is mainly muscovite, rock fragments mainly volcanic, with some schist and chert.

APPENDIX 7. Trace element analyses (ppm) by AA and ICP of Permian and Triassic paleosols from the Sydney Basin, Australia. (for details see appendix 7)

| Paleosol | Hz Spem. # R- | Ba | Cr | Cu | Ga | Nb | Ni | Pb | Rb | Sr | Th | U | V | Y | Zn | Zr |
|------------------|------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| type | O 1668 | 24 | - | - | - | 2 | - | - | 4 | 25 | - | - | - | 11 | - | 40 |
| Birdie | O 1669 | 64 | - | - | - | 2 | - | - | 4 | 66 | - | - | - | 10 | - | 43 |
| coal | O 1670 | 35 | - | - | - | 2 | - | - | 3 | 38 | - | - | - | 11 | - | 44 |
| | A 1671 | 311 | 108 | 59 | 27 | 14 | 11 | 24 | 163 | 37 | 16 | 1 | 141 | 24 | 22 | 255 |
| | A 1672 | 267 | 94 | 42 | 25 | 13 | 11 | 21 | 125 | 40 | 14 | 3 | 115 | 17 | 27 | 224 |
| | A 1673 | 223 | 84 | 22 | 19 | 11 | 6 | 15 | 88 | 32 | 10 | 3 | 85 | 14 | 22 | 203 |
| | C 1674 | 273 | 98 | 25 | 21 | 11 | 5 | 14 | 86 | 34 | 12 | 3 | 94 | 14 | 32 | 235 |
| | C 1675 | 265 | 94 | 35 | 21 | 12 | 5 | 17 | 86 | 34 | 14 | 1 | 95 | 15 | 27 | 233 |
| | C 1676 | 300 | 103 | 39 | 21 | 12 | 9 | 19 | 94 | 37 | 13 | 2 | 103 | 15 | 51 | 225 |
| | - 1677 | 326 | 96 | 22 | 20 | 11 | 18 | 11 | 86 | 35 | 12 | 3 | 97 | 13 | 56 | 215 |
| | - 1678 | 418 | 107 | 40 | 21 | 11 | 15 | 17 | 101 | 42 | 14 | 3 | 108 | 14 | 132 | 235 |
| | - 1679 | 478 | 95 | 17 | 20 | 8 | 14 | 13 | 98 | 41 | 10 | 1 | 96 | 12 | 166 | 200 |
| | - 1680 | 536 | 99 | 15 | 18 | 8 | 26 | 12 | 98 | 42 | 10 | 2 | 96 | 12 | 150 | 169 |
| type | A 1662 | 371 | 113 | 26 | 24 | 14 | 20 | 18 | 116 | 39 | 15 | 2 | 136 | 41 | 95 | 372 |
| Wybung | A 1663 | 364 | 109 | 23 | 23 | 16 | 13 | 24 | 108 | 41 | 17 | 2 | 141 | 42 | 55 | 403 |
| silty | Bw 1664 | 292 | 121 | 45 | 23 | 16 | 15 | 28 | 99 | 34 | 18 | 4 | 152 | 41 | 46 | 376 |
| clay | Bw 1665 | 205 | 102 | 38 | 25 | 16 | 14 | 24 | 69 | 26 | 18 | 4 | 133 | 37 | 37 | 392 |
| | C 1666 | 176 | 106 | 34 | 25 | 17 | 12 | 27 | 51 | 24 | 19 | 3 | 137 | 35 | 35 | 418 |
| | C 1667 | 129 | 90 | 61 | 38 | 20 | 10 | 42 | 8 | 21 | 28 | 7 | 165 | 60 | 17 | 380 |
| type | A 1657 | 363 | 114 | 26 | 24 | 14 | 23 | 15 | 139 | 61 | 14 | 2 | 150 | 42 | 54 | 297 |
| Frazer | A 1658 | 485 | 90 | 17 | 15 | 9 | 13 | 16 | 97 | 44 | 10 | 0 | 84 | 26 | 67 | 339 |
| clay | C 1659 | 435 | 119 | 21 | 21 | 12 | 19 | 17 | 111 | 48 | 13 | 3 | 112 | 35 | 95 | 420 |
| | C 1660 | 473 | 79 | 19 | 17 | 12 | 14 | 19 | 105 | 43 | 14 | 5 | 104 | 32 | 87 | 378 |
| | - 1661 | 433 | 47 | 7 | 9 | 6 | 13 | 10 | 71 | 32 | 7 | 3 | 64 | 17 | 67 | 301 |
| sandst. | - 1656 | 327 | 27 | 17 | 15 | 4 | 19 | 7 | 62 | 51 | 6 | 0 | 94 | 22 | 63 | 102 |
| type | A 1645 | 319 | 61 | 24 | 18 | 8 | 35 | 18 | 85 | 70 | 9 | 2 | 116 | 39 | 49 | 140 |
| Bongon | A 1646 | 391 | 92 | 32 | 21 | 11 | 40 | 22 | 134 | 71 | 15 | 0 | 142 | 36 | 107 | 212 |
| clay | Bw 1647 | 371 | 77 | 31 | 22 | 11 | 35 | 17 | 139 | 58 | 14 | 1 | 134 | 36 | 85 | 170 |
| | Bw 1648 | 406 | 96 | 42 | 23 | 11 | 44 | 21 | 151 | 72 | 13 | 0 | 155 | 40 | 98 | 178 |
| | Bw 1649 | 382 | 84 | 34 | 20 | 10 | 45 | 24 | 117 | 60 | 10 | 0 | 131 | 37 | 161 | 176 |
| | C 1650 | 400 | 77 | 38 | 20 | 10 | 54 | 47 | 128 | 55 | 17 | 0 | 146 | 40 | 184 | 162 |
| | C 1651 | 405 | 95 | 46 | 23 | 11 | 46 | 69 | 150 | 66 | 14 | 1 | 150 | 38 | 79 | 171 |
| | - 1652 | 417 | 90 | 31 | 20 | 11 | 38 | 19 | 120 | 66 | 12 | 0 | 130 | 36 | 147 | 204 |
| type | A 1626 | 343 | - | - | - | 7 | - | - | 210 | 89 | - | - | - | 47 | - | 246 |
| Kerra- | A 1627 | 336 | - | - | - | 5 | - | - | 200 | 87 | - | - | - | 49 | - | 245 |
| bee | C 1628 | 380 | - | - | - | 9 | - | - | 209 | 98 | - | - | - | 43 | - | 277 |
| clay | C 1629 | 583 | - | - | - | 6 | - | - | 116 | 66 | - | - | - | 31 | - | 218 |
| type | A 1622 | 420 | - | - | - | 6 | - | - | 214 | 120 | - | - | - | 42 | - | 231 |
| Woll- | Bw 1623 | 349 | - | - | - | 7 | - | - | 185 | 82 | - | - | - | 44 | - | 224 |
| emi | Cg 1624 | 341 | - | - | - | 6 | - | - | 169 | 69 | - | - | - | 34 | - | 198 |
| clay | Cg 1625 | 693 | - | - | - | <1 | - | - | 138 | 239 | - | - | - | 272 | - | 174 |
| type | A 1617 | 367 | - | - | - | 10 | - | - | 200 | 89 | - | - | - | 47 | - | 301 |
| Cox | A 1618 | 360 | - | - | - | 11 | - | - | 188 | 136 | - | - | - | 50 | - | 328 |
| clay | A 1619 | 423 | - | - | - | 8 | - | - | 138 | 81 | - | - | - | 33 | - | 248 |
| | Bg 1620 | 290 | - | - | - | 9 | - | - | 158 | 77 | - | - | - | 41 | - | 294 |
| | Bg 1621 | 840 | - | - | - | 6 | - | - | 138 | 81 | - | - | - | 32 | - | 208 |
| AA (σ) | - | 11.5 | 1.8 | 1.1 | 1.5 | 0.8 | 1.8 | 1.4 | 0.5 | 1.3 | 0.9 | 0.8 | 2.0 | 0.9 | 0.9 | 4.0 |
| ICP (σ) | - | 16 | - | - | - | 0.6 | - | - | 1 | 3 | - | - | - | 0.6 | - | 7 |

APPENDIX 8. Molecular weathering ratios of Permian and Triassic paleosols, Sydney Basin, Australia.

| Paleosol | Hz | Specimen No. | Na_2O | $\text{CaO}+\text{MgO}$ | Al_2O_3 | Al_2O_3 | Ba | FeO |
|---------------------------------|----|--------------|-----------------------|-------------------------|-------------------------|--|------|-------------------------|
| | | | K_2O | Al_2O_3 | SiO_2 | $\text{CaO}+\text{MgO}+\text{Na}_2\text{O}+\text{K}_2\text{O}$ | Sr | Fe_2O_3 |
| type Birdie coal | O | 1668 | 0.30 | 0.11 | 0.37 | 7.60 | 0.61 | 0 |
| | O | 1669 | 0.30 | 0.31 | 0.34 | 3.02 | 0.62 | 0 |
| | O | 1670 | 0.30 | 0.07 | 0.40 | 10.09 | 0.59 | 0 |
| | A | 1671 | 0 | 0.15 | 0.12 | 2.90 | 5.36 | 0 |
| | A | 1672 | 0 | 0.12 | 0.16 | 3.92 | 4.26 | 0 |
| | A | 1673 | 0 | 0.07 | 0.20 | 6.76 | 4.45 | 0 |
| | C | 1674 | 0 | 0.07 | 0.18 | 5.75 | 5.12 | 5.56 |
| | C | 1675 | 0 | 0.07 | 0.18 | 5.73 | 4.97 | 2.93 |
| | C | 1676 | 0 | 0.07 | 0.19 | 5.78 | 5.17 | 11.51 |
| | - | 1677 | 0 | 0.08 | 0.17 | 5.11 | 5.94 | 6.52 |
| | - | 1678 | 0.04 | 0.11 | 0.17 | 3.85 | 6.44 | 29.10 |
| | - | 1679 | 0.15 | 0.13 | 0.15 | 3.18 | 7.44 | 5.33 |
| | - | 1680 | 0.09 | 0.17 | 0.13 | 2.71 | 8.15 | 6.87 |
| type Wybung silty clay | A | 1662 | 0.15 | 0.08 | 0.17 | 4.35 | 6.07 | 1.94 |
| | A | 1663 | 0.01 | 0.08 | 0.17 | 5.26 | 5.66 | 1.18 |
| | Bw | 1664 | 0.35 | 0.06 | 0.18 | 5.20 | 5.48 | 1.72 |
| | Bw | 1665 | 0.42 | 0.06 | 0.18 | 6.85 | 5.03 | 3.08 |
| | C | 1666 | 0.51 | 0.05 | 0.21 | 8.46 | 4.68 | 0 |
| | C | 1667 | 0.80 | 0.02 | 0.32 | 30.03 | 3.92 | 0 |
| type Frazer clay | A | 1657 | 0.03 | 0.12 | 0.19 | 3.71 | 3.80 | 3.42 |
| | A | 1658 | 0.15 | 0.09 | 0.12 | 3.29 | 7.03 | 2.26 |
| | C | 1659 | 0.16 | 0.09 | 0.16 | 3.73 | 5.78 | 3.42 |
| | C | 1660 | 0.16 | 0.09 | 0.13 | 3.44 | 7.02 | 2.17 |
| | - | 1661 | 0.12 | 0.07 | 0.09 | 3.62 | 8.63 | 2.32 |
| | - | 1656 | 0.52 | 0.26 | 0.07 | 1.75 | 4.09 | 4.11 |
| sst. on Frazer type Bongon clay | A | 1645 | 0.03 | 0.44 | 0.17 | 1.68 | 2.91 | 2.02 |
| | A | 1646 | 0 | 0.20 | 0.17 | 2.70 | 3.51 | 3.10 |
| | Bw | 1647 | 0 | 0.21 | 0.18 | 2.64 | 4.08 | 3.77 |
| | Bw | 1648 | 0.01 | 0.25 | 0.18 | 2.25 | 3.60 | 5.27 |
| | Bw | 1649 | 0 | 0.25 | 0.15 | 2.34 | 4.06 | 5.05 |
| | C | 1650 | 0 | 0.14 | 0.17 | 2.97 | 4.64 | 6.78 |
| | C | 1651 | 0.01 | 0.24 | 0.18 | 2.38 | 3.91 | 3.89 |
| | - | 1652 | 0.07 | 0.23 | 0.15 | 2.31 | 4.03 | 4.98 |
| | - | 1626 | 0.04 | 0.22 | 0.17 | 2.32 | 2.46 | 0.23 |
| | - | 1627 | 0.08 | 0.36 | 0.17 | 1.77 | 2.46 | 0.07 |
| type Kerrabee clay | A | 1627 | 0.08 | 0.36 | 0.17 | 1.77 | 2.46 | 0.07 |
| | C | 1628 | 0.05 | 0.12 | 0.16 | 3.04 | 2.47 | 0.21 |
| | C | 1629 | 0.12 | 0.31 | 0.18 | 2.08 | 5.64 | 0.02 |
| type Wollemi clay | A | 1622 | 0.05 | 0.23 | 0.16 | 2.19 | 2.23 | 0.08 |
| | Bw | 1623 | 0.08 | 0.14 | 0.18 | 3.01 | 2.72 | 0.10 |
| | Cg | 1624 | 0.11 | 0.19 | 0.17 | 2.43 | 3.15 | 0.05 |
| | Cg | 1625 | 0.06 | 0.64 | 0.18 | 1.20 | 1.85 | 0.01 |
| type Cox clay | A | 1617 | 0.07 | 0.12 | 0.18 | 3.31 | 2.63 | 0.66 |
| | A | 1618 | 0.05 | 0.10 | 0.18 | 4.00 | 1.69 | 0.57 |
| | AB | 1619 | 0.09 | 0.17 | 0.17 | 3.05 | 3.33 | 0.01 |
| | Bg | 1620 | 0.12 | 0.12 | 0.15 | 3.48 | 2.40 | 0.29 |
| | Bg | 1621 | 0.09 | 0.68 | 0.17 | 1.16 | 6.62 | 0.01 |

Note: For Appendices 5, 6, and 7, dashes (-) signify analyses not attempted and zeroes (0) are values beyond

detection. Analyses R1631-R1680 are from atomic absorption by Carol Lawson at Macquarie University and R1617-R1629 from inductively coupled plasma-atomics fusion at Bondar Clegg Inc, Vancouver. Bulk density was calculated by weighing clods coated in paraffin of known bulk density (0.8639) in and out of water at the University of Oregon, Eugene, by Timothy Tate. Errors were estimated from 59 analyses of granodiorite GSP-1 for AA major elements and 83 analyses of AHV-1 and 59 analyses of GSP-1 for AA trace element data, of standards 1989 CANMET SY-3 and CANMET SO-2 for ICP, and from 10 replicates of specimen R1614 for bulk density. Molecular weathering ratios were calculated by converting weight percent values (from Appendices 5 and 6) to moles using molecular weights (Retallack, 1990, 1997).

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