

## NASA ADP-DTDP drilling 2004 Pilbara

3 holes

### Mt Magnet Drilling

Drillers:

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Offsiders

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HYDCO SD 1000 rig

Geophysical logging:

Reeves Wireline Services, Phil Sarjeant (geophysicist)

### **ABDP-8: Kelly-Coonterunah**

Hole azimuth 310°, dip 60°, collared 0726967, 7665069 (UTM, AMG84)

Hole was collared in Kelly Group Euro Basalt, ~ 100 m south of unconformity.

Ball-mark from 35.70 m, ORI marks bottom on stick. Continuous core from 20.37 m, without weathering. 60.0 m core-block should be 59.0m. Baroid TR-10 added at 122.7 m, rod-joints lubricated with supermarket 1L olive oil.

EOH survey: 320° azimuth, dip 59°.

<b>0</b>	14.50 14.50 m	Core starts at 14.50 m. Above this depth, hammered through alluvial cobbles of chert and sandstone.
<b>1</b>	0.40 14.90 m	Fractured, shattered, variably silicified (some highly siliceous), pale green, massive aphanitic metabasalt, with rusty weathering along open fractures (irregularly oriented, up to 2 mm wide).
<b>2</b>	0.88	Coherent core (5-10 cm sticks) of pale green, aphanitic metabasalt with silicified irregular fractures up to 2 mm wide filled with pale grey massive microquartz. Metabasalt has creamy silicified alteration patches up to 5 cm across, roughly ellipsoidal, ~80% silicification compared with 50% background silicification. Also 1-2% 1-2 mm subspherical amygdale-like structures scattered through metabasalt, but may be highly silicified patches and not vugh fills. Rare large (5 mm) fractures filled with laminated (0.5 mm) limonite-goethite weathering products.

	15.78 m	Manganese dendrites on fractured surfaces.
<b>3</b>	0.27  16.05 m	Pale green massive metabasalt with subophitic, microlitic texture of 1 x 0.2 mm sub-aligned pale laths of plagioclase. Still variably silicified and containing scattered cherty amygdales and silicified fractures, manganese dendrites on open fractures.
<b>4</b>	0.20  16.25 m	Creamy silicified massive aphanitic metabasalt (pillow margin?) with laminoid fractures, vaguely fragmental texture (2-5 mm) defined by marginal grey microquartz, looks like silicified perlitic fracturing trending towards hyaloclastite, 5% 1 mm amygdale-like subspherical vughs.
<b>5</b>	0.69 16.94 m	Pale green, massive, subophitic/microlitic metabasalt with cherty irregular fractures and manganese dendrites on open fractures, like <b>3</b> .
<b>6</b>	0.52 17.46 m	Creamy silicified perlitic fractured aphanitic metabasalt, like <b>4</b> but more fractured and crumbly (less silicified).
<b>7</b>	0.40  17.86 m	Mid-green, massive, subophitic/microlitic metabasalt with irregular 1-3 mm wide fractures filled with white calcite and marginal bright green chlorite or pumpellyite, 3% 1 mm subspherical grey microquartz amygdales?
<b>8</b>	0.59 18.45 m	Pale-green, massive subophitic/microlitic metabasalt, variably silicified, abundantly fractured, like <b>3</b> .
<b>9</b>	0.18  18.63 m	Mid-green massive, subophitic/microlitic metabasalt with 1-2 mm irregular chert-filled fractures, 3% 1-2 mm subspherical cherty amygdales?, like <b>7</b> but with no carbonate.
<b>10</b>	0.48  19.11 m	Pale-green, highly fractured (5%, 1-3 mm) aphanitic metabasalt, fractures often open or filled with creamy silicified glass(?), irregularly oriented, manganese staining on open surfaces.
<b>11</b>	0.59  19.70 m	Cream-green, highly fractured (10%, 1-10 mm) aphanitic metabasalt, fractures mostly open with central fillings of crystalline megaquartz (1 mm), some areas have vague chloritic skeletal acicular crystals 3 x 0.5 mm after clinopyroxene; irregular patchy pale grey silicified zones up to 5 mm; vague brecciated (5 mm) texture?
<b>12</b>	0.25  19.95 m	Creamy perlitic-fractured aphanitic metabasalt, pillow margin?, with 0.5 mm anastomosing irregular cream fractures surrounding pale green aphanitic cores.
<b>13</b>	0.20 20.15 m	Cream perlitic-fractured metabasalt, like <b>12</b> , and hyaloclastic breccia, fragments almost in place, angular, blocky, 1-2 cm, partially leached, darker color.
<b>14</b>	0.22  20.37 m	Pale green, massive subophitic/microlitic metabasalt, like <b>3</b> but with scattered 0.5 mm irregular cream fractures, limonite-goethite lining fractures.
<b>15</b>	0.11  20.48 m	Dark green hyaloclastic breccia, fragments blocky, sharply angular, slightly displaced, up to 2 x 1 cm, chloritized and some carbonated (calcite), with creamy or chloritic perlitic fractures.
<b>16</b>	0.19  20.67 m	Cream-green aphanitic metabasalt (anastomosed varioles?) with abundant 1 mm blocky fractures filled with grey microquartz or rarely calcite.

<b>17</b>	0.05 20.72 m	Pillow margin with dark green chloritized hyaloclastic breccia, like <b>15</b> but no carbonate, smaller oblique fragments (0.5 x 1 cm).
<b>18</b>	0.10 20.82 m	Cream-green aphanitic metabasalt, like <b>16</b> but more abundant fractures, almost in situ breccia, cut by dark green chloritized hyaloclastite veins 1 cm thick.
<b>19</b>	0.03 20.85 m	Dark green chloritized perlite/hyaloclastic, like <b>17</b> but with marginal parallel creamy perlitic fractures 0.5 mm thick and 0.5 mm apart.
<b>20</b>	0.10 20.95 m	Brecciated cream-green aphanitic metabasalt with ghost skeletal crystals (1 mm long) in places, fragments irregular, up to 10 cm across, subspherical.
<b>21</b>	0.15 21.10 m	Dark green/cream perlite/hyaloclastite, like <b>15</b> and <b>19</b> , chloritized and carbonated blocky fragments up to 2 cm surrounded by creamy subparallel perlitic fractures spaced 0.5-1 mm apart; hyaloclastite dark green (chloritized).
<b>22</b>	0.20 21.30 m	Cream-green aphanitic metabasalt with areas of ghost skeletal acicular crystals (clear, 0.5 mm); coalesced pale varioles which are evident as ~1 cm spherical individuals at base of unit, cut by irregular 1-2 mm fractures filled with chlorite or, where wider, chlorite-calcite.
<b>23</b>	0.10 21.40 m	Dark green/cream hyaloclastite/perlite, like <b>21</b> but grading into variolitic part of <b>22</b> ; large calcite patches 5 cm.
<b>24</b>	1.13 22.53 m	Massive pale-green pillow metabasalt, aphanitic, brecciated at top (1 cm, angular) for 10 cm, then fractures disappear over 10 cm; massive center with 1-2 cm pink calcite patches (1%); lower 10 cm of coalesced varioles then isolated 0.5-1 cm varioles; some areas of ghost skeletal acicular crystals up to 0.5 x 2 mm (pale green, clinopyroxene). Originally magnesian basalt.
<b>25</b>	0.15 22.68 m	Dark green/cream/pale grey perlite/hyaloclastite. Marginal cream/green spherulitic perlite (2 mm spherulites) then dark green/cream laminar perlite, then central blocky hyaloclastite with calcitic alteration.
<b>26</b>	0.30 22.98 m	Variolitic pillow metabasalt, like <b>24</b> but no massive cores, varioles creamy, white, relict skeletal texture, many with ragged margins.
<b>27</b>	0.10 23.08 m	Perlitic pillow margin, like <b>25</b> but no central hyaloclastite.
<b>28</b>	0.50 23.58 m	Variolitic pillow metabasalt, like <b>24</b> but both top and bottom margins variolitic, no breccia though marginal 10 cm, has higher fracture percentage.
<b>29</b>	0.12 23.70 m	Interpillow perlite/hyaloclastite, like <b>25</b> , with central gossanous weathered carbonate fragment 10 x 1.5 cm.
<b>30</b>	2.36 26.06 m	Variolitic pillow metabasalt, like <b>28</b> , with 10 cm quartzose fractured zone (at 23.8 m), variolitic top and bottom zones 10 cm thick of 1 cm spheroidal white varioles, central massive aphanitic zone with areas of ghost skeletal acicular crystals, pale green (actinolite?) after clinopyroxene 2 x 0.3 mm.
<b>31</b>	0.61 26.67 m	Interpillow breccia/perlite/hyaloclastite, like <b>25</b> but with breccia unit of pale green massive metabasalt with 1-2 mm subspheroidal chlorite patches (3%) within hyaloclastite.

<b>32</b>	0.15 26.82 m	Small variolitic metabasalt pillow with adjacent perlite/hyaloclastite.
<b>33</b>	2.60 29.42 m	Interpillow breccia/perlite/hyaloclastite, like <b>31</b> but breccia fragments are variolitic, maybe small pillows (10 cm).
<b>34</b>	0.20 29.62 m	Pale green variolitic pillow, ghost skeletal acicular crystals after clinopyroxene (2 x 0.2 mm).
<b>35</b>	0.74 30.36 m	Interpillow perlite/hyaloclastite/variolitic pillow breccia, varioles up to 2 cm.
<b>36</b>	0.64 31.00 m	Variolitic pillow with brecciated, non-variolitic lower margin, abundant internal fractures 1-3mm filled with calcite and chlorite, grey-pink irregular patches of carbonate alteration 1-5cm
<b>37</b>	0.05 31.05 m	Interpillow perlite/hyaloclastite.
<b>38</b>	0.90 31.95 m	Variolitic pillow with abundant fractures and carbonate alteration patches, like <b>36</b> .
<b>39</b>	0.05 32.00 m	Interpillow perlite/hyaloclastite, very dark green, chloritic.
<b>40</b>	0.66 32.66 m	Pillow with massive top and variolitic base, abundant internal fractures with carbonate/chlorite fillings, 2-10 mm.
<b>41</b>	0.12 32.78 m	Interpillow perlite/hyaloclastite/breccia, fragments with grey/white varioles (grey interiors).
<b>42</b>	0.39 33.17 m	Variolitic pillow, upper varioles zoned, grey/white, up to 2 cm, mostly coalesced varioles.
<b>43</b>	0.93 34.10 m	Interpillow perlite/hyaloclastite/pillow breccia, large carbonate patches to 5 cm, pillow fragments massive up to 5 x 10 cm.
<b>44</b>	0.46 34.56 m	Pillow with variolitic top, brecciated base, abundant 1 mm fractures.
<b>45</b>	0.65 35.21 m	Interpillow perlite/hyaloclastite/pillow breccia, some pillow fragments amygdaloidal with 1-2 mm subspherical chloritic amygdales (3%).
<b>46</b>	0.26 35.47 m	Leached and altered pale green, clayey interpillow perlite/hyaloclastite/pillow breccia with leached carbonate patches.
<b>47</b>	1.01 36.48 m	Altered pale green, clayey pillow with variolitic upper margin, abundant carbonate/chlorite fractures 1-2 mm.
<b>48</b>	0.23 36.71 m	Altered pale green, clayey interpillow perlite/hyaloclastite/pillow breccia.
<b>49</b>	1.54 38.25 m	Mid-green, massive pillow? metabasalt with abundant 1 mm carbonate/chlorite fractures and blocky 1-2 cm pink-grey carbonate alteration patches, variolitic base suggesting pillow, top possibly lost in alteration zone.
<b>50</b>	0.20 38.45 m	Interpillow perlite/hyaloclastite/pillow breccia (variolitic).
<b>51</b>	0.68 39.13 m	Variolitic pillow, interior with white calcitic fractures up to 1 cm.
<b>52</b>	0.56 39.69 m	Interpillow perlite/hyaloclastite/pillow breccia, fragments variolitic; perlite/hyaloclastite dark green chlorite with cream fractures.
<b>53</b>	0.49	Variolitic pillow margin, varioles white, spheroidal, 0.5-2 cm in dark

	40.18 m	green chloritic matrix, coalescing to pillow interior.
<b>54</b>	0.57 40.75 m	Interpillow perlite/hyaloclastite/pillow breccia, fragments variolitic.
<b>55</b>	1.47 42.22 m	Pale green pillow, brecciated top, variolitic base, central irregular 1-2 mm fractures.
<b>56</b>	0.22 42.44 m	Interpillow perlite/hyaloclastite, highly chloritic.
<b>57</b>	0.93 43.37 m	Pillow with variolitic margins, scarce internal fractures 1-3 mm filled with carbonate.
<b>58</b>	1.50 44.87 m	Interpillow perlite/hyaloclastite/pillow breccia with variolitic and amygdaloidal angular, blocky fragments up to 10 cm; amygdales 1-2 mm, chloritic, up to 2%.
<b>59</b>	0.35 45.22 m	Coarsely variolitic pillow margin, varioles white, spheroidal, 1-2 cm in dark green chloritic matrix, coalescing inwards.
<b>60</b>	0.23 45.45 m	Interpillow perlite/hyaloclastite, dark green and chloritic, hyaloclastic shards blocky, cusped, angular, 1 cm.
<b>61</b>	0.87 46.32 m	Variolitic pillow with internal irregular fractures 1-3 mm, variole zone about 10 cm coalescing inwards.
<b>62</b>	0.17 46.49 m	Interpillow perlite/hyaloclastite, some grey carbonate patches, 1-3 cm.
<b>63</b>	1.85 48.34 m	Variolitic pillow, marginal white variolitic zones of 1 cm spheres 5 cm thick, coalescing inwards towards mid-green massive metabasalt.
<b>64</b>	0.11 48.45 m	Interpillow perlite/pillow breccia with fragments of amygdaloidal (1 mm, 3%, chloritic) metabasalt, blocky, 2 x 10 cm.
<b>65</b>	0.30 48.75 m	Variolitic pillow margin, varioles zoned with grey interior, white exterior, 1-2 cm.
<b>66</b>	0.94 49.69 m	Interpillow perlite/hyaloclastite/pillow breccia with fragments of massive metabasalt up to 15 cm.
<b>67</b>	0.61 50.30 m	Variolitic pillow with 5 cm marginal variole zone, massive core.
<b>68</b>	0.08 50.38 m	Interpillow perlite/hyaloclastite.
<b>69</b>	0.49 50.87 m	Pillow with variolitic top, brecciated base and massive core.
<b>70</b>	0.41 51.28 m	Breccia of massive metabasalt and perlite/hyaloclastite with large white calcite vugh 5 x 10 cm.
<b>71</b>	0.19 51.47 m	Variolitic pillow basalt breccia, fragments largely in-situ with 1 mm carbonate-chlorite veins, varioles only at top, dark green interior, pale green exterior.
<b>72</b>	0.04 51.51 m	Perlite/hyaloclastite vein?, oblique, narrow.
<b>73</b>	0.41 51.92 m	Massive microskeletal basalt, acicular crystals 0.5 x 0.1 mm, pale green after clinopyroxene, abundant 1-2 mm carbonate-chlorite fractures.
<b>74</b>	0.12 52.04 m	Perlite/hyaloclastite/pillow breccia with variolitic fragments up to 5 cm in dark green chloritic matrix.
<b>75</b>	2.18	Massive microskeletal basalt, like <b>73</b> , with 10 cm carbonate-chlorite-

	54.22 m	quartz fissure, also 0.5 mm creamy alteration zones irregularly through rock, variolitic base with 0.5-1.5 cm varioles in 5 cm zone.
<b>76</b>	0.31 54.53 m	Interpillow perlite/hyaloclastite/pillow breccia with 15 cm massive basalt fragments, pink-grey carbonate alteration patches 5 cm.
<b>77</b>	0.74  55.27 m	Variolitic pillow basalt with 5 cm marginal zones of 0.5-1 cm zoned varioles (dark green interior, pale green exterior, skeletal textures of 1 mm acicular pale green clinopyroxene crystals), pillow core has microskeletal texture of 0.5 mm pale green clinopyroxene in pale green matrix.
<b>78</b>	0.14 55.41 m	Interpillow perlite/hyaloclastite/pillow breccia with variolitic fragments to 3 cm, perlite and hyaloclastite dark green, highly chloritic.
<b>79</b>	1.12  56.53 m	Variolitic pillow basalt, like <b>77</b> , abundant 1-3 mm fractures filled with carbonate-chlorite, also angular vughs to 5 cm lined with chlorite, filled with pink-grey carbonate.
<b>80</b>	0.08 56.61 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>78</b> .
<b>81</b>	0.26 56.87 m	Variolitic pillow basalt, like <b>77</b> .
<b>82</b>	0.63 57.50 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>78</b> , pillow fragments variolitic, hyaloclasts often carbonated, 5 cm.
<b>83</b>	0.82 58.32 m	Variolitic pillow basalt, like <b>77</b> .
<b>84</b>	0.27 58.59 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>78</b> , floating varioles, zoned dark green to light green, to 2 cm.
<b>85</b>	0.33 58.92 m	Variolitic pillow basalt, like <b>77</b> , very large (3 cm) varioles pale green to cream.
<b>86</b>	0.17 59.09 m	Interpillow perlite/hyaloclastite with angular blocky carbonated fragments to 4 cm.
<b>87</b>	0.39 59.48 m	Pillow breccia with variolitic fragments, 10 cm, in dark green to cream matrix, fragments almost in-situ.
<b>88</b>	0.24 59.72 m	Interpillow perlite/hyaloclastite, like <b>78</b> .
<b>89</b>	0.71 60.43 m	Variolitic pillow basalt, like <b>77</b> .
<b>90</b>	0.17 60.60 m	Interpillow perlite/hyaloclastite with pink-grey, carbonated blocky angular fragments almost in-situ.
<b>91</b>	1.13 61.73 m	Variolitic pillow basalt, like <b>77</b> , scarce 1 mm chlorite-carbonate filled fractures, some angular 2 cm vughs with pink-grey carbonate.
<b>92</b>	0.19 61.92 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>78</b> .
<b>93</b>	1.07 62.99 m	Variolitic pillow basalt, like <b>77</b> but poorly defined 3 cm marginal variole zones.
<b>94</b>	0.33 63.32 m	Interpillow perlite/hyaloclastite fragments floating in carbonated matrix, have internal perlitic fractures.
<b>95</b>	0.54 63.86 m	Variolitic pillow basalt, like <b>77</b> , with very poorly defined 3 cm marginal variole zones.

<b>96</b>	0.34 64.20 m	Interpillow perlite/hyaloclastite/pillow breccia with massive basalt fragments to 10 cm, creamy alteration common.
<b>97</b>	0.46 64.66 m	Variolitic pillow basalt, like <b>77</b> , abundant 1-2 mm chlorite-filled fractures in core.
<b>98</b>	0.10 64.76 m	Interpillow perlite/hyaloclastite pillow breccia, like <b>78</b> , 2 cm carbonated hyaloclastic fragments.
<b>99</b>	0.18 64.94 m	Massive aphanitic metabasalt, pale green, fractured.
<b>100</b>	0.88 65.82 m	Interpillow perlite/hyaloclastite/pillow breccia with 5 cm variolitic fragments, hyaloclastite carbonated, perlitic fractures with creamy alteration.
<b>101</b>	0.64 66.46 m	Variolitic pillow basalt, like <b>77</b> , poorly defined lower variole zone.
<b>102</b>	0.26 66.72 m	Interpillow perlite/hyaloclastite/pillow breccia with creamy alteration in perlitic fractures, variolitic pillow fragments.
<b>103</b>	0.21 66.93 m	Variolitic pillow basalt.
<b>104</b>	0.21 67.14 m	Interpillow perlite/hyaloclastite/pillow breccia, variolitic pillow fragments to 8 cm.
<b>105</b>	5.64 72.78 m	Massive dark green micro-skeletal(?) basalt, variolitic upper margin, flow interior with 0.3 mm acicular pale green crystals in aphanitic matrix, moderately abundant chlorite-carbonate filled fractures 1-2 cm, creamy alteration zones, 2 cm carbonated shears.
<b>106</b>	0.12 72.90 m	Interflow perlite/hyaloclastite, some carbonate void fill.
<b>107</b>	1.34 74.24 m	Variolitic pillow basalt, like <b>77</b> , well defined marginal variole zones 10 cm with 2 cm zoned spherical varioles, abundant 1-4 mm chlorite-carbonate filled irregular fractures in pillow interior, varioles skeletal with 1 mm acicular pale green crystals after clinopyroxene, but pillow interior is aphanitic.
<b>108</b>	0.15 74.39 m	Interpillow perlite/hyaloclastite.
<b>109</b>	0.65 75.04 m	Variolitic pillow basalt, like <b>107</b> but varioles have creamy green exterior zones.
<b>110</b>	0.45 75.49 m	Interpillow perlite/hyaloclastite/pillow breccia, with massive basalt fragments to 10 cm, hyaloclastite heavily carbonated.
<b>111</b>	0.62 76.11 m	Variolitic pillow basalt, like <b>107</b> but with creamy varioles.
<b>112</b>	0.34 76.45 m	Interpillow perlite/hyaloclastite/pillow breccia, with variolitic fragments, pink carbonate vughs.
<b>113</b>	0.38 76.83 m	Variolitic pillow basalt, like <b>107</b> but with internal brecciation, with varioles in chloritic glassy matrix?
<b>114</b>	0.15 76.98 m	Interpillow perlite/hyaloclastite, fragments blocky, angular, almost in-situ, 3 cm, internal perlitic fractures (chloritic), some fragments carbonated (pink).
<b>115</b>	0.29	Variolitic pillow basalt, like <b>107</b> but with abundant internal fractures,

	77.27 m	chloritic, 1-3 mm.
<b>116</b>	0.08 77.35 m	Interpillow perlite/hyaloclastite, like <b>114</b> .
<b>117</b>	0.38 77.73 m	Massive skeletal (pale green, 1 mm acicular crystals after clinopyroxene) basalt, abundant fractures 1-3 mm, chloritic.
<b>118</b>	0.07 77.80 m	Interpillow perlite/hyaloclastite/pillow breccia with massive basalt fragments to 2 cm.
<b>119</b>	0.93 78.73 m	Variolitic pillow basalt, like <b>107</b> .
<b>120</b>	0.64 79.37 m	Interpillow perlite/hyaloclastite/pillow breccia with variolitic fragments to 10 cm, also massive and amygdaloidal?
<b>121</b>	0.33 79.70 m	Variolitic pillow basalt, like <b>107</b> .
<b>122</b>	0.80 80.50 m	Interpillow perlite/hyaloclastite/pillow breccia with variolitic fragments to 10 cm, pink carbonate in hyaloclastite.
<b>123</b>	0.31 80.81 m	Variolitic pillow basalt, like <b>107</b> .
<b>124</b>	1.06 81.87 m	Interpillow perlite/hyaloclastite, like <b>114</b> , plus 0.94 m of variolitic pillow basalt and 0.06 m of interpillow material.
<b>125</b>	0.20 82.07 m	Variolitic pillow basalt, like <b>107</b> but with 3 cm pale grey to white varioles.
<b>126</b>	0.36 82.43 m	Interpillow perlite/hyaloclastite/pillow breccia with amygdaloidal fragments, 5 cm.
<b>127</b>	0.76 83.19 m	Variolitic pillow basalt, like <b>107</b> but with 3 cm pale grey to white varioles.
<b>128</b>	0.08 83.27 m	Interpillow perlite/hyaloclastite/pillow breccia with amygdaloidal? fragments to 3 cm.
<b>129</b>	0.30 83.57 m	Variolitic pillow basalt (out of place – 84.0 m core block 10 cm before end).
<b>130</b>	0.78 84.35 m	Interpillow perlite/hyaloclastite/variolitic pillow margins, apparently interstices of several pillows.
<b>131</b>	0.57 84.92 m	Variolitic pillow basalt.
<b>132</b>	0.42 85.34 m	Interpillow perlite/hyaloclastite/pillow breccia, with 5-10 mm white carbonate veins.
<b>133</b>	0.91  86.25 m	Variolitic pillow basalt, marginal varioles skeletal with 1 mm pale green acicular crystals, interior microskeletal with 0.5 mm acicular pale green crystals (actinolite after clinopyroxene?), varioles 5-10 mm, zoned, dark green interior, pale green exterior, pillow core has abundant 1-3 mm irregular chloritic fractures.
<b>134</b>	0.73  86.98 m	Interpillow perlite/hyaloclastite/pillow breccia with variolitic and massive basalt fragments (rounded, 10 cm); hyaloclastite fragments blocky, angular to 3 cm, often carbonated; perlite chloritic with creamy alteration along some fractures. Order: pillow margin with scattered varioles in chlorite matrix to laminoid perlite to hyaloclastite to pillow breccia.

<b>135</b>	2.91 89.89 m	Very large, variolitic basalt pillow? Interior dark green, microskeletal, variolitic zones top and bottom (88.0 m core block at 89.0 m).
<b>136</b>	0.10 89.99 m	Interpillow perlite/hyaloclastite.
<b>137</b>	0.87 90.86 m	Variolitic pillow basalt, like <b>133</b> but with large (1-3 cm) chlorite-carbonate veins.
<b>138</b>	0.10 90.96 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>134</b> but only massive basalt fragments.
<b>139</b>	1.00 91.96 m	Variolitic pillow basalt, like <b>133</b> but with 5-10 cm white carbonate veins.
<b>140</b>	0.10 92.06 m	Interpillow laminoid perlite with fine (5 mm) hyaloclastite, some carbonated (pink).
<b>141</b>	1.97 94.03 m	Variolitic pillow basalt, like <b>133</b> but with 2 cm angular pink-grey carbonate vughs (93.0 m core-block is 94.0 m, exactly right spot).
<b>142</b>	0.34 94.37 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>134</b> but hyaloclastite has pink carbonate alteration.
<b>143</b>	0.58 94.95 m	Variolitic pillow basalt, like <b>133</b> .
<b>144</b>	0.12 95.07 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>134</b> .
<b>145</b>	0.21 95.28 m	Variolitic pillow basalt, like <b>133</b> but only variolitic zone present.
<b>146</b>	0.38 95.66 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>134</b> , basalt fragments massive.
<b>147</b>	0.15 95.81 m	Variolitic pillow margin.
<b>148</b>	0.14 95.95 m	Interpillow perlite/hyaloclastite with pink carbonate alteration.
<b>149</b>	0.72 96.67 m	Massive dark green skeletal basalt, acicular 2 mm green crystals (actinolite after clinopyroxene?).
<b>150</b>	0.24 96.91 m	Interflow laminoid perlite/hyaloclastite with pink carbonate alteration.
<b>151</b>	0.44 97.35 m	Massive pale green skeletal basalt, like <b>149</b> but with abundant 1 mm irregular chloritic fractures.
<b>152</b>	0.41 97.76 m	Interflow laminoid perlite/hyaloclastite.
<b>153</b>	0.36 98.12 m	Variolitic pillow basalt, like <b>133</b> .
<b>154</b>	2.10 100.22 m	Interflow breccia of perlite/hyaloclastite and basalt fragments up to 15 cm; some massive, some variolitic, some amygdaloidal?; hyaloclastite has much pink carbonate alteration.
<b>155</b>	1.78 102.00 m	Massive mid-green aphanitic basalt, abundant irregular chloritic fractures, vaguely variolitic zone at 0.90 m along with chloritic shears (strained interpillow perlite?).
<b>156</b>	0.57 102.57 m	Interflow laminoid perlite/hyaloclastite/basalt breccia, pink carbonate alteration.

<b>157</b>	2.20 104.77 m	Large variolitic pillow, weakly defined 5 cm variolitic zones, interior massive and aphanitic with 10 cm quartz-carbonate vughs and veins.
<b>158</b>	0.85 105.62 m	Interpillow perlite/hyaloclastite with central grey amorphous chert vein with white megaquartz, some variolitic pillow fragments.
<b>159</b>	3.60 108.22 m	Massive skeletal mid-green basalt with vague marginal variolitic zones, acicular green crystals 2 mm long (actinolite after clinopyroxene?), some 2-3 cm chlorite-carbonate fractures (after glass?).
<b>160</b>	0.20 108.42 m	Interflow laminoid perlite/hyaloclastite with strong pink carbonate alteration.
<b>161</b>	1.00 109.42 m	Weakly variolitic (3 cm) pillow basalt?, interior pale green, strongly skeletal (acicular crystal sheaves, 3 mm), scattered (2%) 1 mm equant dark green crystals (after olivine?).
<b>162</b>	0.04 109.46 m	Interpillow perlite/hyaloclastite.
<b>163</b>	0.26 109.72 m	Weakly variolitic, skeletal olivine basalt, like <b>161</b> but cream-green with abundant orthogonal 1 mm carbonate fractures.
<b>164</b>	0.14 109.86 m	Interpillow perlite/hyaloclastite/basalt breccia, cream-green with carbonate veins.
<b>165</b>	0.59 110.45 m	Weakly variolitic skeletal olivine basalt, like <b>161</b> with 3 cm carbonate vughs.
<b>166</b>	0.06 110.51 m	Interpillow perlite/hyaloclastite, cream-green.
<b>167</b>	1.01 111.52 m	Weakly variolitic skeletal olivine basalt, like <b>161</b> .
<b>168</b>	0.08 111.60 m	Interpillow perlite/hyaloclastite, cream-green, with 1 cm carbonate veins.
<b>169</b>	0.77 112.37 m	Weakly variolitic skeletal olivine basalt, like <b>161</b> but cream-green.
<b>170</b>	0.39 112.76 m	Interpillow laminoid perlite/hyaloclastite/pillow breccia, cream-green, with 1 cm carbonate veins.
<b>171</b>	0.24 113.00 m	Massive cream-green skeletal olivine basalt with abundant 1 mm chlorite-carbonate fractures.
<b>172</b>	0.08 113.08 m	Interpillow laminoid perlite/hyaloclastite, cream-green.
<b>173</b>	0.54 113.62 m	Massive cream-green skeletal olivine basalt, like <b>171</b> .
<b>174</b>	0.03 113.65 m	Interpillow laminoid perlite, cream-green.
<b>175</b>	0.50 114.15 m	Weakly variolitic, pillowed, cream-green, skeletal olivine Mg-basalt, varioles cream, 0.5-2 cm, skeletal with 2-3 mm acicular cream crystal sheaves after clinopyroxene, 2% 1 mm equant green crystals (after olivine?), some 1-3 mm irregular carbonate veins.
<b>176</b>	0.88 115.03 m	Pillow breccia with massive cream-green skeletal Mg-basalt, fragments up to 12 cm in grey laminoid perlite/hyaloclastite matrix with 1 cm white carbonate patches.
<b>177</b>	0.34	Limonitic weathered pillow breccia, like <b>176</b> but oxidized.

	115.37 m	
<b>178</b>	2.94 118.31 m	Fine (clasts 1-5 cm) hyaloclastic/pillow breccia, fragments equant, subangular to subrounded, white to pale grey, of aphanitic Mg-basalt, 80% glassy, 20% basalt, in perlite/hyaloclastite matrix, some bright green pumpellyite? in perlite; silicified.
<b>179</b>	0.51 118.82 m	Massive grey-green highly skeletal Mg-basalt, almost stringy-beef in places (acicular crystals 1 cm long, subparallel), no olivine pseudomorphs evident.
<b>180</b>	0.08 118.90 m	Interpillow breccia of varioles in chloritic hyaloclastite matrix.
<b>181</b>	0.28 119.18 m	Weakly variolitic cream-green skeletal pillow basalt, like <b>175</b> .
<b>182</b>	0.15 119.33 m	Interpillow laminoid perlite/hyaloclastite with 5 cm white megaquartz veins.
<b>183</b>	1.43 120.76 m	Variolitic cream-green skeletal (clinopyroxene), olivine-phyric Mg-basalt pillow, like <b>175</b> , lower varioles 3 cm, zoned.
<b>184</b>	0.12 120.88 m	Interpillow laminoid perlite/hyaloclastite/pillow breccia with massive basalt fragments, 3 cm.
<b>185</b>	0.34 121.22 m	Weakly variolitic cream-green skeletal olivine-phyric Mg-basalt, like <b>175</b> .
<b>186</b>	2.00 123.22 m	Hyaloclastic/pillow breccia, like <b>178</b> but basalt fragments skeletal and olivine-phyric Mg-basalt, no pumpellyite.
<b>187</b>	0.82 124.04 m	Weakly variolitic cream-green skeletal olivine-phyric Mg basalt, like <b>175</b> .
<b>188</b>	0.16 124.20 m	Interpillow basalt breccia of olivine-phyric Mg-basalt (not skeletal), fuchsite margin.
<b>189</b>	1.10 125.30 m	Amygdaloidal (4-10 mm, 5%, fuchsite filled, subspheroidal), olivine-phyric (0.5 mm equant, green, 30%) Mg-basalt, grey-green, more olivine and amygdales than others, less amygdales downward.
<b>190</b>	0.38 125.68 m	Silicified, sulphidized and brecciated igneous rock with 1 mm round quartz phenocrysts, no embayments, clear phenocryst laths (0.5 mm) in aphanitic pale green-cream matrix; may be altered <b>189</b> or perhaps felsic porphyry intrusion; sulphides in lobate 1-3 mm bodies, perhaps amygdales suggesting volcanism.
<b>191</b>	0.76 126.44 m	Variolitic cream-green olivine-phyric Mg-basalt, varioles cream, up to 3 cm, microskeletal texture with 0.2 mm acicular clear crystals, 2% 0.5 mm olivine? pseudomorphs, moderately silicified.
<b>192</b>	0.38 126.82 m	Interpillow perlite/hyaloclastite/pillow breccia, cream-green, fragments blocky, angular, up to 4 cm, moderately silicified, some 3 mm pyrite veins, in places weathered to goethite-limonite.
<b>193</b>	0.34 127.16 m	Variolitic cream-green pillowed Mg-basalt, like <b>191</b> .
<b>194</b>	0.29 127.45 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>192</b> but no sulphide or iron oxides.
<b>195</b>	0.26 127.71 m	Variolitic cream-green pillowed Mg-basalt, like <b>191</b> .

<b>196</b>	0.04 127.75 m	Interpillow perlite/hyaloclastite, cream-green, magnesian.
<b>197</b>	0.30 128.05 m	Variolitic cream-green pillowed Mg-basalt, like <b>191</b> .
<b>198</b>	0.40 128.45 m	Interpillow perlite/hyaloclastite/pillow breccia, cream-grey, fragments of variolitic pillow margin blocky, angular, up to 5 cm.
<b>199</b>	1.04 129.49 m	Variolitic, pillowed Mg-basalt, cream, skeletal acicular crystals up to 5 mm long, 2% 0.5 mm olivine pseudomorphs.
<b>200</b>	0.48 129.97 m	Interpillow perlite/hyaloclastite/pillow breccia, creamy, magnesium, like <b>198</b> .
<b>201</b>	0.31 130.28 m	Variolitic pillowed Mg-basalt, cream, like <b>199</b> .
<b>202</b>	0.12 130.40 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>198</b> .
<b>203</b>	0.57 130.97 m	Variolitic pillowed Mg-basalt, cream, like <b>199</b> .
<b>204</b>	0.69 131.66 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>198</b> .
<b>205</b>	0.66 132.32 m	Variolitic pillowed Mg-basalt, cream-grey, like <b>199</b> .
<b>206</b>	0.26 132.58 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>198</b> , 5 cm quartz-pyrite vugh.
<b>207</b>	0.99 133.57 m	Variolitic pillowed Mg-basalt, cream, like <b>199</b> .
<b>208</b>	0.09 133.66 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>198</b> .
<b>209</b>	1.06 134.72 m	Variolitic pillowed Mg-basalt, cream-grey, like <b>199</b> .
<b>210</b>	0.12 134.84 m	Interpillow perlite/hyaloclastite/pillow breccia, like <b>198</b> .
<b>211</b>	1.47 136.31 m	Variolitic pillowed Mg-basalt, cream-grey, like <b>199</b> , 10 cm quartz vugh or vein.
<b>212</b>	1.70 138.01 m	Interpillow perlite/hyaloclastite/ pillow breccia, cream-grey, like <b>198</b> , abundant pillow fragments, variolitic Mg-basalt, fragments to 10 cm.
<b>213</b>	0.20 138.21 m	Variolitic pillowed Mg-basalt, cream-grey, like <b>199</b> .
<b>214</b>	0.04 138.25 m	Interpillow perlite/hyaloclastite, cream-grey.
<b>215</b>	0.47 138.72 m	Variolitic pillowed Mg-basalt, cream-grey, like <b>199</b> .
<b>216</b>	0.11 138.83 m	Interpillow perlite/hyaloclastite, cream-grey, moderately silicified.
<b>217</b>	1.24  140.07 m	Variolitic pillowed Mg-basalt, cream-grey, like <b>199</b> , skeletal texture of 0.5 mm acicular pale grey crystals (tremolite after clinopyroxene?) in aphanitic groundmass, 0.5% 0.3 mm equant pseudomorphs after olivine?

<b>218</b>	0.32 140.39 m	Interpillow perlite/hyaloclastite/pillow breccia with variolitic Mg-basalt, fragments to 10 cm.
<b>219</b>	1.12 141.51 m	Variolitic pillow Mg-basalt, cream-grey, like <b>217</b> .
<b>220</b>	0.08 141.59 m	Interpillow perlite/hyaloclastite, cream-grey.
<b>221</b>	0.47 142.06 m	Massive cream-grey microskeletal olivine-phyric Mg-basalt, has fabric that looks like flow banding, moderately abundant irregular 1 mm quartz-pyrite filled fractures.
<b>222</b>	0.55 142.61 m	Flow-base perlite/hyaloclastite/pillow breccia, laminar fabric showing some shearing?, pillow fragments of microskeletal olivine-phyric cream Mg-basalt, Siliceous fractures (5 mm) common; 5 mm relief on basal contact, looks depositional.
<b>223</b>	2.18 144.79 m	Massive-amorphous grey-white vein chert with diffuse fragments (5 cm) of cream silicified igneous rock (metabasalt?), also rare (1%) fragments (1-5 mm) of black chert; on microscale, looks brecciated with 0.5 mm angular blocky fragments of black chert, grey chert, silicified igneous rock in matrix of clear-white chert; scattered 0.5 mm pyrite crystals; irregular patches of white chert, 1 cm white quartz veins; fault-filling?
<b>224</b>	0.14 144.93 m	Brecciated black kerogenous vein chert, fragments 0.1-10 mm, angular, blocky, in pale chert matrix, amorphous; black chert massive, microquartz; matrix has 1% 0.1 mm pyrite, cut by 0.1 mm black stylolites; rare green basalt fragments.
<b>225</b>	0.03 144.96 m	Brecciated amorphous-massive pale chert in massive black kerogenous chert matrix which intrudes underlying unit; bounded by bituminous? pyritic stylolites.
<b>226</b>	0.40 145.36 m	Amorphous-massive pale chert, translucent, pale grey with 1% 0.1 mm pyrite, micro-brecciated fabric with 0.3 mm angular fragments of pale chert in pale chert matrix; rare black chert, green chert fragments, 1-10 mm white quartz vughs and veins, diffuse margins; bounded by black stylolites.
<b>227</b>	1.83 147.19 m	Wavy-laminated bedded chert, layers 1-10 mm, flexures 5-10° from horizontal, inter-layered pale grey chert, white chert, clear drusey quartz, white sucrosic quartz; pale grey chert has 1-5% 0.1 mm cream rhombic dolomite laminae 1 mm thick; white chert has 1-5% 0.1 mm pyrite disseminations; clear quartz has black bituminous? stylolitic boundaries; some 1-2 cm arenaceous units of rounded 0.5 mm subspheroidal volcanogenic? grains in clear chert cement, well-sorted, massive; creamy sericitic? alteration zones, along cross-cutting fractures; layers have diffuse boundaries; some mottled zones 1-5 cm thick with white and pale grey 1-3 mm equant mottles (replaced crystals?); some brecciated zones with 1-3 cm blocky clasts of grey wavy laminated chert in matrix of grey massive chert, clasts have diffuse boundaries; can't subdivide because of diffuse boundaries, vague stratification.

<b>228</b>	0.24  147.43 m	Massive to weakly laminated medium silicified arenite, grains subrounded to subangular, 0.4 mm (well-sorted), subspheroidal, in clear chert cement; grains 70% grey amorphous (silicified carbonate?), 20% creamy sericitic (volcanogenic?), 10% dark grey (black chert?); some megaquartz veins.
<b>229</b>	1.56  148.99 m	Wavey-laminated bedded chert, like <b>227</b> but less well laminated, more abundant and thicker (10 cm) breccia zones with diffuse boundaries, more creamy sericite or carbonate alteration (soft), arenite laminae absent, mottled zones rare.
<b>230</b>	1.10  150.09 m	Massive to weakly laminated fine-medium silicified arenite, like <b>228</b> but grains range from 0.2-0.5 mm, show weak normal grading over 2 cm in some laminae; some white quartz veins 2 cm thick, trace 0.1 mm pyrite, scattered cream sericite alteration or residual carbonate; dominant grey grains may be fine quartz, clear, not chert after carbonate or volcanic glass (doesn't look quartzose).
<b>231</b>	0.02 150.11 m	Wavey laminated bedded chert, like <b>227</b> .
<b>232</b>	2.39  152.50 m	Coarse quartz sandstone, grains 1-3 mm, spheroidal, well rounded, well-sorted, in white chert cement, weakly compacted but some suturing; weakly laminated, 1-2 cm, defined by grain size; some laminae contain 1% rounded spherical pyrite 0.5-2 mm; grains 95% clear quartz, 3% black chert, 2% white volcanogenic clasts.
<b>233</b>	0.17 152.67 m	Wavey-laminated bedded chert, like <b>227</b> .
<b>234</b>	0.20 152.87 m	Course quartz sandstone, like <b>232</b> .
<b>235</b>	0.23 153.10 m	Wavey-laminated bedded chert, like <b>227</b> .
<b>236</b>	1.14  154.24 m	Coarse quartz sandstone, like <b>232</b> but more compacted and sutured, highly pyritic in basal 5 cm (5%), also basal pebbles of white chert to 10 mm.
<b>237</b>	0.20 154.44 m	Black massive vein chert and brown silicified coarse-grained igneous rock? (metagabbro) - fragment in vein?
<b>238</b>	0.55 154.99 m	Coarse quartz sandstone, like <b>236</b> , up to 7% pyrite pebbles to 10 mm common, quartz and white chert (unconformity immediately below).
<b>239</b>	1.85  156.84 m	Silicified coarse-grained igneous rock? below unconformity; massive metagabbro? with vague 2-3 mm irregular interlocking grains, some sericitized, others like leucoxene; with abundant 1-2 cm anastomosing grey chert veins with diffuse margins, chert vein content decreases downwards; upper contact has 3 mm relief, no evident change in grain size or composition towards contact; basal sandstone rests on chert, not metagabbro? with 1-2 mm brown limonitic-goethite zone at contact, no evident displacement.
<b>240</b>	2.51	Vein of brecciated black kerogenous chert with aphanitic black kerogenous chert fragments 0.5-15 mm, blocky, angular, in grey translucent chert matrix, 0.5% 0.5 mm pyrite; massive; some 1-3 cm

	159.35 m	white quartz and grey chert veins.
<b>241</b>	0.24 159.59 m	Fragment of silicified and veined metagabbro, like <b>239</b> .
<b>242</b>	0.18 159.77m	Vein of black brecciated chert, like <b>240</b> .
<b>243</b>	0.11 159.88 m	Fragment? of fine pyritic sandstone, like <b>228</b> but with 2% 0.2 mm rounded pyrite.
<b>244</b>	0.46 160.34 m	Black brecciated vein chert, like <b>240</b> .
<b>245</b>	0.19 160.53 m	Fragments of silicified metagabbro? like <b>239</b> , in black brecciated vein chert like <b>240</b> .
<b>246</b>	0.48 161.01 m	Black brecciated vein chert, like <b>240</b> with scattered 1 cm metagabbro fragments.
<b>247</b>	0.15  161.16 m	Grey medium arenite, like <b>228</b> but up to 50% black chert grains at top, very well sorted, no grading, weak lamination defined by black grain abundance.
<b>248</b>	0.80  161.96 m	Altered and silicified metagabbro? with 1 mm blocky cream-pink leucoxenes? in blocky 1 mm sericitized matrix, like <b>239</b> , abundant black and grey quartz veins to 2 cm, patches of pale brown-cream sericite alteration to 10 cm, picking out lathey matrix, where matrix is not sericitic matrix is pale green (chloritic?) instead.
<b>249</b>	0.46 162.40 m	Black brecciated vein chert, like <b>240</b> .
<b>250</b>	1.27  163.67 m	Grey medium arenite, like <b>228</b> ; at top well laminated (1 cm) defined by percentage of black grains; in middle 5 cm very fine grained zone (silt-mud, grey-black); toward base becomes massive, medium grained 0.3-0.4 mm, well sorted; pyritic alteration at bottom margin.
<b>251</b>	1.77  165.44 m	Silicified and sericitized metagabbro?, like <b>239</b> , with 20% 5-20 mm black chert veins containing 1 mm angular blocky black chert fragments in pale chert matrix (microbreccia).
<b>252</b>	0.66  166.10 m	Massive metabasalt, finer grained than metagabbro (0.5 mm rather than 1 mm), pale green (chloritic) rather than cream brown (sericitic), green 5% 1 mm acicular phenocrysts after clinopyroxene, no large blocky leucoxenes, still moderately silicified.
<b>253</b>	0.40 166.50 m	Altered and silicified metabasalt, like <b>252</b> but cream-brown, sericitized, abundant 1 cm black chert veins and vughs.
<b>254</b>	4.28  170.78 m	Black chert breccia vein, with 1-10 cm angular blocky fragments of massive black vein chert like <b>240</b> ; coarse quartz sandstone with detrital pyrite like <b>236</b> ; silicified and sericitized metagabbro, like <b>239</b> ; grey medium arenite with 1 cm laminae, like <b>228</b> ; in pale chert matrix.
<b>255</b>	0.14 170.92 m	Altered and silicified metabasalt, like <b>253</b> .
<b>256</b>	0.30 171.22 m	Black chert breccia vein, like <b>254</b> but maximum fragment size is 3 cm, only black chert, quartz sandstone and metagabbro.
<b>257</b>	0.40 171.62 m	Massive pale green metabasalt, like <b>252</b> but slightly sericitized.

<b>258</b>	0.46 172.08 m	Black chert breccia vein, like <b>256</b> but 3% pyrite.
<b>259</b>	0.57 172.65 m	Massive pale green metabasalt, like <b>252</b> but with 20% 1-5 cm black chert microbreccia veins.
<b>260</b>	0.63 173.28 m	Massive pale green metabasalt, like <b>252</b> .
<b>261</b>	0.75 174.03 m	Black chert breccia vein, like <b>256</b> .
<b>262</b>	0.34 174.37 m	Massive pale green metabasalt, like <b>252</b> but with 30% black chert microbreccia, veins and vughs to 8 cm.
<b>263</b>	0.07 174.44 m	Grey chert breccia vein with 1-20 mm angular fragments of black chert (5%) and sericitized igneous rock (3%) floating in massive translucent grey chert matrix.
<b>264</b>	0.07 174.51 m	Altered and silicified metabasalt, like <b>253</b> .
<b>265</b>	0.02 174.53 m	Grey chert breccia vein, like <b>263</b> but with 5 mm rounded spherical quartz grains.
<b>266</b>	13.56  188.09 m	Massive pale green metabasalt, like <b>252</b> , 30% 0.5 mm acicular pale green crystals (actinolite after clinopyroxene) in matrix of lathey 0.3 mm pale grey plagioclase, subophitic texture (therefore metatholeite?), no amygdales, with occasional 1-5 cm translucent grey chert veins with marginal sericitized zones containing 1% pyrite, rare 1 cm cream dolomite veins, all veins comprise <3% of section.
<b>267</b>	0.16 188.25 m	Massive pale-green silicified flow top or chilled margin, felted texture of fine 0.2 mm laths, scattered pyrite and carbonate grains 0.5 mm, sharp contact with overlying coarse-grained basalt.
<b>268</b>	2.27 190.52 m	Massive pale-green metatholeiite, like <b>266</b> , fine-grained (0.3 mm) at top and gradually coarsening (0.6 mm) downwards over 2 m, a few white quartz-cream dolomite veins 1 cm, fine-grained base like top.
<b>269</b>	0.10 190.62 m	Massive mid-green metadolerite, subophitic grains 0.8 mm.
<b>270</b>	6.91 197.53 m	Massive pale-green metatholeiite, like <b>268</b> with fine-grained top but 1 cm pale-green saussuritized clots below upper 1 m, some 1-10 cm quartz-carbonate-chlorite sheared zones, fine base.
<b>271</b>	12.23 209.76 m	Massive dark-green metagabbro, doleritic upper margin, after 1 m has 1-2 mm grains and 40% 1-2 cm mid-green saussuritization clots, occasional 1-2 cm quartz-pyrite veins, ophitic texture, some quartz-chlorite sheared veins to 1 cm thick.
<b>272</b>	0.09 209.85 m	Quartz-chlorite shear zone.
<b>273</b>	4.72 214.57 m	Massive dark-green metatholeiite, grains 0.5-1 mm, subophitic texture, dark green-black clinopyroxene rectangles in grey plagioclase groundmass, 3-5% leucoxene, scattered 1-2 cm quartz-chlorite veins, also white dolomite? veins.
<b>274</b>	0.25	Pale green alteration zone with sheared quartz-chlorite veins dissecting fine-grained (0.2-0.5 mm) saussuritized basalt, 2% pyrite, flow

	214.82 m	boundary?
<b>275</b>	4.79 219.61 m	Massive dark-green metatholeiite, like <b>273</b> but with 1-3 cm quartz-chlorite-pyrite veins.
<b>276</b>	0.51  220.12 m	Massive mid- to pale-green altered metatholeiite, paler downwards, subophitic texture lost but 1-2 mm chlorite mottles in aphanitic matrix, 1-5% disseminated pyrite 0.5 mm increasing downwards, lower margin sericitized, laminoid perlite.
<b>277</b>	0.08    220.20 m	Plane-laminated chert, layering 0.5-10 mm, undulose contacts between laminae with 1-2 mm relief, layers of: micro-laminated pyrite-chert, pale grey translucent chert with disseminated (3%) 0.3 mm white rhombs of non-reactive carbonate (siderite or dolomite?), pink-grey opaque chert with 5% disseminated 0.5 mm carbonate rhombs; abundant (3%) pyrite veinlets and vughs 1-5 mm, micro-laminated pyrite not clearly a different generation; pink bands contain patches (1-5 mm) and veins of red haematite, clearly secondary (haematite restricted to fractures and fracture junctions), patches have clear chert cores where iron remobilized outward, some clear cores have internal pyrite; pyrite veinlets appear to cross-cut haematite veinlets.
<b>278</b>	0.20 220.40 m	Massive dark-green metatholeiite, like <b>273</b> but with 3% disseminated 0.5 mm pyrite.
<b>279</b>	0.01 220.41 m	Micro-laminated (0.3 mm) pyrite and clear chert, wavy layering with 0.5 mm relief, sericitic creamy alteration for 2 cm on either side in basalt.
<b>280</b>	0.50 220.91 m	Massive dark-green metatholeiite, like <b>273</b> but finer grained (0.3mm), rare quartz-chlorite-pyrite veins (1cm)
<b>281</b>	0.41 221.32 m	Massive pale-green altered metatholeiite, sericitized and silicified, increasing in intensity downwards, subophitic texture lost.
<b>282</b>	0.30  221.62 m	Plane-laminated chert, like <b>277</b> but no haematite patches or veins, has a 10 cm layer of massive translucent grey chert without carbonate rhombs but chlorite veinlets.
<b>283</b>	0.52  222.14 m	Massive creamy altered metabasalt, sericitized and silicified, perlitic texture, in places brecciated (1 cm), alteration increases towards margins.
<b>284</b>	0.24 222.38 m	Plane-laminated chert, like <b>282</b> , micro-faulted and in-situ brecciated by abundant fractures with 5 mm throw.
<b>285</b>	0.43 222.81 m	Massive creamy altered metabasalt, like <b>283</b> but retains fine subophitic texture.
<b>286</b>	0.05 222.86 m	Plane-laminated chert, like <b>277</b> but no micro-laminated pyrite-chert; haematitic red chert forms irregular band cross-cut by pyritic fractures.
<b>287</b>	0.15 223.01 m	Massive mid-green altered metabasalt.
<b>288</b>	0.05 223.06 m	Plane-laminated chert, like <b>277</b> but no haematite.
<b>289</b>	0.47 223.53 m	Massive mid-green to creamy altered metabasalt, like <b>287</b> but brecciated in places, 1 cm angular blocky fragments.
<b>290</b>	0.33	Plane-laminated chert, like <b>277</b> .

	223.86 m	
<b>291</b>	0.82 224.68 m	Massive cream-green altered metabasalt, like <b>289</b> but with 1 cm quartz-pyrite veins.
<b>292</b>	0.31 224.99 m	Plane-laminated chert, like <b>277</b> , brecciated at lower margin.
<b>293</b>	0.45 225.44 m	Massive and brecciated cream altered metabasalt, like <b>289</b> , breccia has chlorite matrix.
<b>294</b>	0.09 225.53 m	Plane-laminated chert, like <b>277</b> .
<b>295</b>	0.17 225.70 m	Sheared breccia of plane-laminated chert and cream altered metabasalt, fragments lenticular, up to 5 cm, in sericitic groundmass.
<b>296</b>	1.13 226.83 m	Massive pale-green altered metabasalt, with 0.5 mm subophitic texture, sericitic alteration.
<b>297</b>	21.36  248.19 m	Massive dark-green metatholeiite, 0.5 mm subophitic texture with green-black clinopyroxene to amphibole needles in grey plagioclase groundmass, with 1 cm irregular quartz-chlorite veins, some paler, moderately altered zones (sericitized) about 0.5 m thick; basal strongly altered zone with fabric destruction, pale-green sericitization, flow boundary?
<b>298</b>	6.42  254.63 m	Massive dark-green metatholeiite, like <b>297</b> but slightly coarser grained (0.7 mm); basal strongly altered zone over 20 cm thick, sericitized (fabric destructive), abundant 1-2 mm chlorite veins; moderate 1 cm quartz veining with marginal pyrite, some pink calcite.
<b>299</b>	1.19  255.82 m	Massive pink altered metabasalt, fabric subophitic 0.5 mm, but largely overprinted by silica-haematite-sericite-epidote alteration, sericite-epidote clearly along and adjacent to fractures, haematite pervasive but concentrated in irregular linear zones suggesting fracture association, some quartz-chlorite-epidote fractures have grey-silver metallic mineral (0.2 mm) - specular haematite?
<b>300</b>	16.76  272.58 m	Massive dark-green metatholeiite, like <b>297</b> , chlorite-epidote alteration at top, moderately abundant epidote-calcite-chlorite veins 1-3 cm brecciating basalt in places, pink staining to vein calcite in places, more epidote alteration near base.
<b>301</b>	0.84 273.42 m	Massive pink haematite-silica altered metabasalt, like <b>299</b> but with 5-10 mm epidote-chlorite clots, some massive haematite alteration at base.
<b>302</b>	4.62  278.04 m	Massive pale-green epidotized altered metabasalt, some haematite alteration beside quartz-chlorite veins; epidote disseminated, 5% 0.5 mm clots, more abundant near veins.
<b>303</b>	7.12 285.16 m	Massive dark-green metatholeiite, like <b>297</b> , epidote alteration at top and near base, scattered 1 cm blebs of pyrite and chalcopyrite.
<b>304</b>	1.38 286.54 m	Massive pale-green silicified metabasalt, alteration fabric destructive, abundant quartz-chlorite veins 0.5-2 cm.
<b>305</b>	0.06 286.60 m	Massive pale-grey translucent chert with 3% 0.5 mm white carbonate rhombs, marginal pyrite (3 mm, 3%) in chlorite.
<b>306</b>	1.07	Massive pale-green silicified metabasalt, like <b>304</b> but also sericitized (creamy) at base, 5 mm pyrite blobs, abundant quartz-chlorite veins 1

	287.67 m	cm.
<b>307</b>	0.91 288.58 m	Plane-laminated chert, like <b>277</b> but no micro-laminated pyrite-chert, pink bands have disseminated haematite, not veined, some 1 cm creamy sericitic bands with acicular crystal pseudomorphs – devitrified glass?, brecciated by sericitic veins in places.
<b>308</b>	12.07 300.65 m	Amygdaloidal pale-green metatholeiite; amygdales quartz-chlorite-pyrite, spherical 1-3 mm, 1-2%; basalt fine grained (0.3 mm), felted green clinopyroxene to amphibole microlites in grey plagioclase groundmass with pervasive sericite-silica-pyrite alteration, which is more intense where amygdales denser, no obvious pillows; abundant quartz-chlorite veins 1-10 mm, also white calcite veins 1-5 mm; some highly chloritic zones 1-5 cm thick between highly sericitic zones with sharp contacts, may be pillow or flow boundaries.
<b>309</b>	0.09 300.74 m	Highly chloritic hyaloclastite? with subangular ellipsoidal devitrified crystalline fragments 1-2 cm in dark chlorite groundmass – pillow or flow boundary?
<b>310</b>	6.02 306.76 m	Amygdaloidal pale-green metatholeiite, like <b>308</b> but quartz and calcite veins rare.
<b>311</b>	0.03 306.79 m	Mid-grey opaque chert, bedded, 1% 0.5 mm white carbonate, 1% 0.5mm pyrite cubes, adjacent basalt highly sericitic.
<b>312</b>	0.02 306.81 m	Massive dark-green chloritic meta-mafic, complete fabric destruction, 2% 1 mm pyrite cubes.
<b>313</b>	0.24 307.05 m	Plane-laminated chert, 3-50 mm, inter-layered pale-grey translucent chert with 1% 0.5 mm white carbonate rhombs, white translucent chert, mid-grey opaque chert with 1% 0.5 mm carbonate rhombs, dark-grey opaque chert, mid-grey opaque chert with 1 x 3 mm ovoid dark-grey chert lenses (30%); 1-2 mm pyrite cubes scattered throughout, also form 2-4 mm laminae between chert layers; boundaries between laminae sharp, wavy with 1-3 mm relief.
<b>314</b>	0.06 307.11 m	Massive dark-green chloritic meta-mafic, like <b>312</b> but with sericitic margins.
<b>315</b>	0.01 307.12 m	Mid-grey opaque chert, like <b>311</b> .
<b>316</b>	0.11 307.23 m	Massive dark-green meta-mafic with sericitic margins, like <b>314</b> .
<b>317</b>	0.02 307.25 m	Mid-grey opaque chert, like <b>311</b> but with 2% 1 mm pyrite cubes.
<b>318</b>	0.59 307.84 m	Amygdaloidal pale-green metatholeiite, like <b>308</b> , sericitized top and bottom margins; amygdales 1-3 mm, 1-5%, more abundant near margins.
<b>319</b>	0.23 308.07 m	Plane-laminated chert, like <b>313</b> but little dark-grey opaque chert.
<b>320</b>	0.10 308.17 m	Massive dark-green meta-mafic with sericitic margins, pervasively silicified, mottled texture, no igneous fabric.
<b>321</b>	1.43	Plane-laminated chert, 3-50 mm thick, like <b>313</b> but also 5% black opaque chert, magnetic with 1% 0.1 mm round white grains; chloritic

	309.60 m	partings and sericitized patches to 1 cm thick.
<b>322</b>	0.26 309.86 m	Massive dark-green silicified meta-mafic, like <b>320</b> .
<b>323</b>	3.69  313.55 m	Plane-laminated chert. 10% black opaque magnetic, 20% translucent white, 20% translucent pale grey, 40% opaque mid-grey with black lenses, 10% opaque dark grey; dark grey has haematitic alteration in some laminae; extensively faulted (throws up to 2 cm) and fractured, sericitic alteration in fractures; black magnetic bands also have very weak haematite alteration in places, 1% disseminated 0.1 mm pyrite, micro-lamination on 0.2 mm scale; more haematitic downwards, picks out particular dark grey and black opaque chert laminae and micro-laminae, cut by fractures, does not seem to be fracture-associated but pervasive in laminae; includes breccia zone of pale brown, non-reactive carbonate 3 cm thick.
<b>324</b>	0.06 313.61 m	Inter-layered dark-green meta-mafics and pale-grey translucent vein chert.
<b>325</b>	16.19  329.80 m	Porphyritic metatholeiite, 2-3 mm blocky green phenocrysts (saussuritized plagioclase?) in pale grey groundmass of felted clinopyroxene and plagioclase (0.3 mm), weakly amygdaloidal (<1%, 1-3 mm, quartz-chlorite filled), variable sericitic and chloritic alteration, phenocrysts sometimes twinned, up to 30%; amygdales only in top 1 m, phenocrysts less saussuritized downwards, also less sericitic alteration; occasional quartz-chlorite shear zones (4 cm) and veins (1 cm); ends looking like gabbro, but groundmass still fine (0.3 mm).
		Hole ended with worn-out bit. Should be well beyond last unit of topmost Coonterunah chert, with ~ 80 m more drilling required to get to next.

Survey:

329.8 m – 320° azimuth , 59° dip N.

Geophysical logging. Blockage of gravel and cuttings at 14.5m. Tried dummy probe but couldn't break through, at junction between RC hammer precollar and NQ, so maybe flange collected gravel from below. PVC casing (which only goes down 0.7 m). Checked with caliper gamma, shows 5-15 cm enlargement by caving in 14 m section of rubble.