

# Description of the Five Cores Drilled in the Vicinity of Budge Drive, Jackson, Wyoming in April and May, 2014

An addendum to the  
**Geologic Report on the Slide near  
Budge Drive, Jackson, Wyoming**  
to the Jackson Town Council  
by the Geologists of Jackson Hole.

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# Core Descriptions for LT-1 to LT-5 Cores cut at Budge Drive Landslide Site

## Core Description LT-1

John J Heberger Jr. 16 May 2014

Interval (feet)	Description	Recovery %
0-5.0	NR	0
5-10.0	A mix of pebbles to large cobbles; dark andesite(?), quartzite, fine grained white sandstone. Photos 0024-25	40
		
10-15.0	Mix of pebbles to cobbles as above.	20
15-17.5	Same as above	40
17.5-20	Same as above. Photos 0026-27.	35



20-22.5 Upper few inches is pebbles to small cobble of rounded black andesite(?). Below this to base of interval is a brown clay-laden siltstone that has occasional rounded pebble sized clasts; Photo 0028. Bottom ~8" is more a dark gray, very silty-fine sand laden claystone, pretty well lithified, still has a few small pebbles in it. Photo 0029

70



22.5-23.8 Same as base of above interval, though more of a clay-rich siltstone. Large sub-round andesite (dark volcanic) clasts. Photo 0030.

85



23.8-25 Tan-brown clay-rich conglomeratic siltstone; sub-angular to sub-rounded pebble sized clasts that appear to be mostly (?) andesite (? Dark volcanic at any rate), though also light sandstone. Photo 0031



25-30

Tan-brown conglomeratic silty fine grained sandstone; clasts are pebble to perhaps small cobble size, some are rounded white sandstone (well lithified) to larger rounded to sub-rounded andesite (dark volcanic); Photos 0032-33. At base is a 3" core through what was perhaps a large cobble of white, well lithified sandstone, rounded to subrounded grains (Photo 0034).

45



30-32.5 Well rounded fluvial pebbles to small cobbles that consist of: red fine grained moderately dirty sandstone that is well sorted, rounded to subrounded grains (mostly quartz, but significant admixture of dark to black, white grains; perhaps some mica); Light dense quartz sandstone or even quartzite; dark volcanic (andesite?). Photos 0035-36.



32.5-33

Very similar to immediately above. Photo 0037.

>100!??



33-35

Very similar to immediately above. Photo 0038.

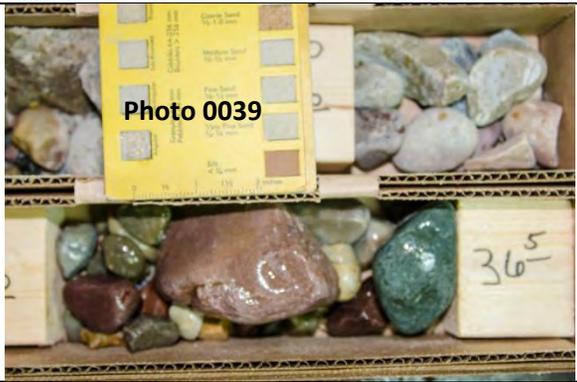
25



35-36.5

Very similar to immediately above Photo 0039

30



36.5-37.5	Very similar to immediately above Photo 0040	35
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37.5-40	NR	0
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	<b>Total Depth of Core</b>	
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# Core Description LT-2

John J Heberger Jr. 8 May 2014

Interval (feet)	Description	Recovery %
0-4.5	NR	0
4.5-6	<b>Conglomerate</b> , brown; matrix is fine-very fine sand, predominantly quartz but 3-5% black grains (andesite?) with admixture of other colored grains (red, green). Clasts range from coarse sand to pebble size & are sub-angular to sub-rounded; black andesite (?) predominates but occasional white clasts that are softer than knife blade, appear crystalline in character. One 3" piece of core, rest are smaller rubble from coring action.	35
6-8.5	<b>Conglomerate</b> as above; one 3" piece, rest is small rubbly pieces.	15
8.5-11	Mostly <b>conglomerate</b> , rounded broken pieces from large pebble up to xsmall cobble size. There are several highly rounded large pebbles that are NOT conglomerate: one is red, appears to be dense fine grained SS; other 2-3 are rounded dark andesite(?); see PHOTOS 0013-14.	25
11.0-16.0	NR	0

16-20	Upper few inches of recovered core are rounded <b>pebbles</b> of off-white to light gray quartzite (dense, knife leaves steel on surface), of dark andesite, and of conglomerate as above (though rounding possibly from coring). Next 6" of recovered material is <b>conglomerate</b> as above; this piece though has multiple pebble sized clasts of red scoria (PHOTO 0015-16). Below that is ~1' of light gray, very poorly consolidated conglomerate; sand to pebble sized clasts, mostly black andesite?; fair amount of clay in conglomerate.	65
20-21	Light gray very fine sandstone, grading downwards into light gray silty claystone. Sand is predominantly quartz with admixture of 2-4% black (andesite?) grains. No obvious bedding. Moderately well consolidated but both sand and claystone can readily be scratched by finger nail.	100
21-23.5	Light brown to gray massive <b>siltstone</b> ; poorly consolidated. No apparent bedding.	75
23.5-26	Same light brown <b>siltstone</b> for upper 1'+, then 8"-10" of brown <b>conglomerate</b> with sandstone matrix and angular to sub-angular coarse sand to pebble sized clasts that are presominantly dark andesite. Below that appears to possibly grade into brown <b>siltstone</b> for bottom 1' to base of interval.	100
26-27	Recovered core is weakly consolidated conglomeratic fine brown sandstone with infrequent rounded coarse sand size to small pebble sized clasts; clasts are predominantly dark andesite with admixture of other types.	75
27-33.5	NR	0
33.5-36	Completely unconsolidated fine grained brown <b>sand</b> .	4
36-38.5	Very poorly consolidated brown well sorted fine grained sand, not really consolidated at all.	60
38.5-41	Same as above.	50
41-43.5	Recovered sample is very poorly consolidated brown conglomerate with fine sand matrix and coarse sand to pebble sized clasts. One large clast is angular dark andesite.	10
43.5-46	Recovered sample is very poorly consolidated brown conglomerate with fine sand matrix and coarse sand to pebble sized clasts. Clasts are angular dark andesite?	12
46-46.2	Same as above.	200!!
46.2-49	<b>Conglomeratic brown siltstone</b> with coarse sand size to pebble sized sub-angular to sub-rounded clasts (predominantly dark andesite?), grades downward into same but coarser matrix ( <b>very fine to fine sand</b> ), predominantly quartz, though with a small admixture of dark (andesite?) and other color grains. Lower ~1' interval the conglomerate clasts disappear, apparently over 1-2" and the lower 1' is a pure very fine sub-angular quartz <b>sandstone</b> PHOTO 0018	100



Photo 0018

49-51	<p>Uppermost 6" is brown conglomeratic <b>fine sandstone</b> with clasts up to small pebble size but predominantly coarse sand size. Clasts are dark andesite? And pale green ?? Below 6" core transitions into a darker, nearly "light black" fine well sorted sub-angular <b>fine sandstone</b> predominantly quartz, with small percentage (2-4%) of black grains. There are some clasts of very small pebble size floating in the fine sand matrix (PHOTO 0019), the clasts appear to be concentrated in discrete zones.</p>	100+
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51-53.8	Continuation of fine to very finewell sorted dark quartz sandstone with sub-rounded to sub-angular clasts of coarse sand to small pebble size; composition of clasts appears to be dark andesite?, dirty fine sandstone. No apparent bedding in core.	100
53.8-56	Same as above.	100
56-61	Upper 18" of core is very similar fine to very fine dark sandstone as above, perhaps a few more andesite? clasts in lower portion. Below that the sandstone changes color abruptly and this lower ~2' is brown in color and more conglomeratic, especially the upper most 3", a 1" horizon in middle, and the lower 2"; this last 2" contains red, white, yellow sub-rounded clasts. The above sits direction on a 3" cobble (?) of a dense (well lithified) light colored poorly sorted fine sandstone with sub-angular clasts; apparently not quartz, knife scored grains and leaves no steel on them. PHOTOS 0020-21. The very bottom has broken andesite pieces, whether broken from small cobbles or a larger piece broken by coring is not evident.	60



Photo 0020



61-63

Appears to be all well rounded pebbles to small cobbles and likely larger cobbles drilled by the core bit. Range from: dense red sandstone; light quartzite; dark volcanic rock with large white phenocrysts; dark dense fine grained volcanic (andesite?) PHOTOS 0022-23.

45



Photo 0022



Photo 0023

Total Depth of Core

## Core Description LT-3

John J Heberger Jr. 8 May 2014

Interval (feet)	Description	Recovery %
0-5'	NR	0
5-6.5	Andesite, gray, dense fine grained uniform texture. All rounded pebble sized debris as a result of coring action.	50
6.5-9	Same as above, though largest recovered piece is 3" in length	40
9-9.5	Same as above with largest recovered piece ~2" in length.	50
9.5-11.5	Same as above with largest recovered piece ~3" in length.	45
11.5-14	Same as above with largest recovered piece ~1.5" in length.	10
14-16.5	NR (no recovery)	0
16.5-17.5	Same as above with largest recovered piece ~1" in length.	25
17.5-19	Same as above with largest recovered piece ~2" in length.	25
19-19.5	Same as above with largest recovered piece ~2" in length; but there is one 4" long conglomeration of rounded andesite "pebbles" (pieces) that is held together by a gray, silty clay matrix. Not clear where clay is derived from.	65
19.5-21	Same as above with largest recovered piece ~2.5" in length.	30
21-24	Same as above with largest recovered piece ~4" in length. At base there is one 3" long conglomeration of rounded andesite pieces that is held together by a gray, silty clay matrix. Again not clear where clay might be derived from.	40
24-26.5	Andesite largely as above except that: the one largely coherent piece of core has a prominent ~horizontal contact in it where andesite abruptly goes from dark gray to light gray; there is a steeply dipping foliation plane (~450) that was apparently open about 3/4" and which is filled with brecciated, angular andesite clasts held together by a clay matrix (PHOTO_9993).	25



Photo 9993

26.5-31.5

Upper ~1' (??) is darker gray **andesite** as everywhere above except in the small piece described immediately above where there is the 3" thick layer of lighter andesite. All broken rubble except for piece at bottom which is ~3.5" in length. Immediately below this piece of andesite there is an abrupt (?) transition to a brown, slightly silty **clay-claystone** that is quite malleable between the fingers; it has some sub-angular clasts (andesite?) from large sand to pebble size. It is likely that nearly all the recovery is from this lower part of the core which extends to the interval's base. PHOTO 9994

60



Photo 9994

31.5-34

Entire interval is **claystone** as above (brown, slightly silty) with what appear to all be andesite clasts ranging in size from large sand to one small cobble. PHOTOS 9995 shows drilled andesite cobble; 9996 shows unwrapped claystone with multiple sub-angular andesite clasts.

100



Photo 9995



Photo 9996

34-36.5	<p>Of recovered core upper 3" is same <b>Clay-Claystone</b> as above. Below that is ~7" of <b>Conglomerate</b> mostly in two large pieces; lighter brown (than claystone above) with sand size to pebble sized clasts; clasts are sub-angular to sub-rounded to rounded; black andesite most angular; are from very dark (black) to gray white in color PHOTO 9997; dark clasts appear to be andesite, light ones are: fine grained sandstone (well sorted, sub-rounded, 98% quartz 2% black grains; other clast is 100% quartz); one or more quartzite? or dense chert? clasts - knife leaves steel on clast; also are a few red grains. Matrix is poorly sorted sands of various sizes and grain types.</p>	30
		
36.5-39	<p>Upper few inches is one 2" very light <b>andesite</b> piece with broken pieces below of a much darker <b>andesite</b>; all likely cobbles - pebbles beneath the conglomerate??. Below this is ~1.5" of a grayish-brown, silty <b>clay-claystone</b><sup>1</sup>. Below this is ~6" of dark gray slightly silty claystone with occasional clasts of sub-rounded to sub-angular andesite, mostly small pebble sized. The clasts are "floating" in the clay matrix.</p>	40
39-41.5	<p>Same slightly silty <b>clay-claystone</b><sup>1</sup> as above with same admixture of clasts, mostly andesite. There are some other unidentified and quite weathered coarse sand size clasts. Very bottom 4" has horizontal seemingly stretched out lenses of very fine sand-like nature? PHOTO 9998.</p>	100



41.5-44 Same slightly silty grayish-brown **clay-claystone** as above. Abundant andesite clasts from coarse sand size up to small cobble size. All appear to be "floating" in the claystone matrix, are sub-rounded to angular (PHOTO 9999).

100+



44-44.2 Same as above.

150%

44.2-46.5	Same <b>clay-claystone</b> as above (PHOTO 0002). Same angular to sub-angular andesite clasts of large pebble to coarse sand size.	100
		
46.5-51.5	<p>Same <b>clay - claystone</b> as above (PHOTO 0001). Same angular to sub-angular andesite clasts of large pebble to coarse sand size. Clasts which are elongate in shape do at least in some cases appear to demonstrate a roughly sub-horizontal orientation which if this is the interpreted debris flow might have had some laminar aspect to its flow. See PHOTO 0001.</p> <p><b>NOTE:</b> There is no apparent bedding in this clay-claystone, all clasts "float" in the clay matrix, and this is strongly indicative of a mass flow, a debris flow. The fact that clasts seem to be entirely angular to sub-angular andesite of sand size to cobble size suggests that they were likely introduced catastrophically into the clay matrix.</p>	100+



Photo 0001

51.5-56.5

More of same **clay-claystone** as above. Andesite clasts are mostly sand size, some pebble sized, one large cobble size (PHOTO 0003).

100+



Photo 0003

56.5-59.5	<p>More of <b>same clay-claystone</b> as above. Andesite clasts are mostly sand size, some pebble sized. Upper 2' of this interval is clearly clast poor as compared to the bottom 2'; see PHOTO 0004. But there is NO evidence of any bedding and in all cases the clasts are matrix supported. PHOTO 0006 is of the lower, clast "rich" zone just above 59.5'.</p>	100+
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 <p style="text-align: center;"><b>Photo 0004</b></p>	 <p style="text-align: center;"><b>Photo 0006</b></p>	
59.5-61.5	<p>Same grayish-brown <b>clay-claystone</b> as in lower part of prior (above) interval (clast rich). Clasts from coarse sand size to large cobble size and with one exception all andesite; the exception is a pebble of red scoria (PHOTO 0007). TD of well is in large cobble?? of andesite (PHOTO 0007).</p>	100



## Well Total Depth

<sup>1</sup> Note about **clay-claystone**. When initially examined under the somewhat dim fluorescent lights of the garage the claystone appeared to be darker, more black in color. When examined under much brighter more natural light on table it is clearly NOT black, but a grayish-brown color. So thoughts about anoxic environment (even slightly so) were likely in error. The clay-claystone is at best semi-lithified, hence not a genuine claystone, but being semi-lithified I have termed a clay-claystone ("almost" claystone would be accurate!).

**NOTE:** There is no apparent bedding in this **clay-claystone**, all clasts "float" in the clay matrix, and this is strongly indicative of a mass flow, a debris flow. The fact that clasts seem to be entirely angular to sub-angular andesite of sand size to cobble size suggests that they were likely introduced catastrophically into the clay matrix.

# Core Description: LT-4

0' - 197' (TD)

by John J Hebberger Jr., 2 May, 2014

Core Interval (feet)	Description	Recovery % (estimated)
0-5	No Recovery (NR)	0
5'-7'	Brown, slightly silty clay	90
7'-12'	Andesite (?), fine grained, "dirty; contains reddish brown crystals (garnet?) & green crystals (olivine?). One nearly whole piece, so rest is likely completely unrecovered.	25
12'-14.5'	Andesite?; mostly broken pieces	50
14.5'-17'	Andesite?; broken bits	35
17'-19'	Broken pieces, along horizontal planes	70
19'-22'	Andesite?; lots of broken bits, 1 piece with a long, nearly vertical foliation (?) plane; there is apparent weathering along this interpreted foliation plane	50
22'-27'	Andesite?; Broken bits, apparently along horizontal planes	10
27'-29'	Andesite?; rounded rubble!	20
29'-29.5'	Andesite?; light in color, almost looks like fine grained SS; abundant black crystals (pyroxenes?)	100
29.5'-32'	Andesite?; broken, partly rounded pieces	50
32'-34.5'	Andesite?; broken, partly rounded pieces	30
37'-39.5'	"	<40
39.5'-42'	Andesite?; only 1 piece, ~3"-4" long	<10
42'-44.5'	Andesite?;pieces	35
44.5'-47'	Andesite?; largest piece = 2" long	35
47'-49.5'	Andesite?; loose rubble, most pieces <1" long	35
49.5'-52'	Andesite?; Top is broken bits. Lower half is massive with subvertical shear or foliation planes; these are weathered so likely open before drilling, likely foliation planes (see PHOTO below)	80



52'-52.5'	Andesite?; Sub-vertical foliation planes with drk mineralization on planes (see PHOTO above)	~100
52.5'-54.5'	Andesite?; rounded rubble! (see PHOTO above)	30
54.5'-57'	Andesite?; rounded rubble except for bottom 4"	35
57'-59.5'	Andesite?; rounded rubble(see PHOTO above)	35
59.5'-62'	Andesite?; rounded rubble; red mineralization along foliation planes	30
62'-64.5'	Andesite?; rounded rubble at top, pieces 3"-4" long at bottom	45
64.5'-65.7'	Andesite?; just broken pieces	75
65.7'-67'	Andesite?; broken bits, quite rounded	70
67'-69.5'	Andesite?, fine grained with mostly equant crystal size, light gray in color. Broken, largest piece is 3.5", most are <1"	35
69.5'-72'	Andesite, same as above. Also mostly small pieces (<1"), but largest ~4"	45
72'-74.5'	Andesite, same as above; small broken & rounded rubble	35

74.5'- 75.5'	NR	0
75.5'-77'	Andesite as above; Rubble to ground bits	30
77'-82'	Andesite, as above; rubble to ground bits, though 1 piece =3"	10
82'-83'	NR	0
83'-86'	NR	0
86'-87'	Andesite, as above; broken pieces <1" up to 2.5" in size	75
87'-92'	Andesite, as above; rounded bits & one piece 3" in length	10
92'-93'	Andesite, as above; Broken pieces, one bit is semi-together but almost clay-like in texture	75
93'-94.5'	Andesite as above; upper part is rubble, then nearly 1' massive, cohesive; bottom 6" is highly weathered(?), turning to clay (PHOTO below)	95



94.5'-97'	Altered andesite? Darker, highly altered/weathered? Hard to see individual crystals. Weathered out vugs?? Upper part nearly clay or clay-like with broken hard fragments in it. (PHOTO above)	75
97'-99.5'	Altered andesite? Upper few inches coherent, hard, see crystals. Below this there are hard pieces but much of it is friable and clay-like. Much of the lower part is very like clay, but there do appear to be crystals that look like those in the unaltered andesite higher above. (see PHOTO above)	100
99.5'-100.5'	Altered andesite? Same description as above	80
100.5'-102'	Conglomerate? Highly weathered(?), claylike. Dark brown. Angular to sub-angular clasts up to 3/4". Even the harder, more well lithified pieces can be broken by hand. (see PHOTO below)	100

102'-107'	Dark brown conglomerate, highly weathered? Sandy-clay matrix, clasts up to small pebble size (very dark). Sub-rounded to sub-angular in shape (clasts; andesite??). Many very dark clasts (andesite?) and white clasts; occasional red clast. Bottom 1/2 this section badly broken up. (see PHOTO below)	70
		
107'-111.2'	Dark brown conglomerate, highly weathered? Sandy-clay matrix, clasts up to small pebble size (very dark). Sub-rounded to sub-angular in shape (clasts; andesite??). Many very dark clasts (andesite?) and white clasts; occasional red clast. Lower part of this section is mostly a dirty SS, there are no large clasts (PHOTO above)	100
111.2'-112'	Same as the dirty SS as above but there are a few sub-angular black clasts (andesite?)	100
112'-117'	Conglomerate, dark brown; silty-sandy matrix, a bit muddy?. Very mixed larger clasts from coarse sand-size up to small pebble size. Clasts are sub-angular to sub-round; black, white, green, red; Bigger clasts are mostly black (andesite?).	80

Conglomerate as above. Much of recovery rather broken. Appear to be 2"-3" zone of sandstone (no large clasts). 8"-10" piece in middle that is very lithified, in this piece see bedding, coarser & finer grained layers (see two PHOTO below). Then below this is back to broken & less lithified conglomerates in box.

117'-121'

80





121'-  
124.5'

Conglomerate like above. Mostly broken pieces, but one 5" piece that is lithified, has black angular clasts (see PHOTO below).

40



124.5'- 127'	Conglomerate like above; Pieces recovered are well lithified. Lots of black, sub-angular to sub-rounded clasts.	35
127'- 129.5'	Conglomerate as above; mostly broken into small pieces, is one 3" piece.	25
129.5'- 132'	NR	0
132'-137'	Conglomerate at top transitions downward to black Clay-Claystone (see 3 PHOTOS below). Upper part is conglomerate, brown with some pebble size clasts. Appears to fine downward to muddy silt-sandstone, then becomes gray to gray-black mudstone. Clay texture.	45



137'-140'	Clay-claystone, dark gray to light black. Bottom is a fine-very fine Sandstone that is light gray. Well sorted & sub-angular, dirty, lots of black grains. Poorly consolidated.	90-95
140'-145'	Very fine grained sandstone to siltstone; dark gray, friable, clay rich	15

145'-145.9'	Clay-claystone (soft clay); dark gray. But has some clasts in it up to pebble size (andesite?; sub-angular)	100
145.9'-147'	Clay-claystone, gray-brown that grades downward into Fine Sandstone. SS is well sorted, sub-angular, and dirty (quite a few black, some red grains; 2-5%?)	100
147'-150'	All but bottom 4" is gray-brown silty clay-claystone (gritty in mouth). Bottom 4" is hard rubble, probably drilled cobbles; see piece of conglomerate & probably andesite? (see PHOTO below)	100



150'-154'	Drilled & broken up cobbles of multiple types: volcanic (andesite?); reddish quartzite or re-crystallized quartz ss with red grains in it. Dense greenish quartzite. All well rounded cobbles & large pebbles. (see PHOTOS above & below)	30
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154'-155'	NR	0
155'-157'	Diverse, well rounded pebbles to large cobble (black dacite from north end of N Gros Ventre Butte? Per Dave Adams). Quartzite, Gneiss? Or granite piece (see 3 PHOTOS below)	70





157'-159'	Pieces of large pebbles - small cobbles.	5
159'-160'	Pieces of large pebbles; white & red quartzite; dark volcanics (see PHOTO below)	45



160-167'	NR	0
167'- 169.5'	Pebbles to small cobbles at top of or possibly IN silty, dark gray clay (see PHOTO below)	45
169.5'- 182'	NR	0
182'-187'	Large pebbles (volcanics?) held together by silty dark gray clay	1
187'-192'	One 3.5" piece of andesite	5
192'-197'	One 6"-8" piece of andesite??; perhaps from a boulder? Don't see rounded edge, just cylinder cut of core (see 1 PHOTO below)	15



**Total Depth at 197'**

## Core Description LT-5

John J Heberger Jr. 7 May 2014

Interval (feet)	Description	Recovery %
0-5'	NR	0
5-5.5	Brown, silty, unconsolidated <b>clay</b> . Gritty texture on tongue. Appear to be a few small pebble sized very dark clasts - andesite?	85
5.5-10.5	NR	0
10.5-15.5	Dark gray, fine grained, foliated and massive <b>andesite</b> . Weathering & mineralization apparent along steep foliation planes.	15
15.5-19.5	Dark gray, fine grained, foliated and massive <b>andesite</b> . Don't see the steep foliation in this section. Upper part is rubbleized andesite, rounded into large pebbles (almost certainly by action of coring operation). Lower 2/3 of sample is pretty coherent, intact full core broken along gently dipping to nearly horizontal surfaces that do have some mineralization (iron oxides?)	45
19.5-20.5	Mostly as above	80
20.5-23.5	Mostly as above. There is a thin zone ~3/4 way down that is highly altered (?) <b>andesite</b> , it has become a rubbly clay zone about 1" thick, appears to have developed along a dipping foliation plane.	70
23.5-25.5	Mostly as described above but more broken into rubble, no large coherent piece any larger than about 3" in length.	50
25.5-28.5	Mostly as above of <b>andesite</b> . This section though is mostly coherent, complete core pieces with foliation planes that dip perhaps around 30°.	90
28.5-30.5	Mostly as above of <b>andesite</b> . Lower 1/2 is though more broken.	75
30.5-33	As above for <b>andesite</b> description. This interval more broken, upper part rubbly, rounded / ground into rounded pebble & small cobble sized pieces.	50
33-35.5	As above for <b>andesite</b> description. This interval quite broken into pieces though that have been rounded by the coring action.	45
35.5-39.5	<b>Andesite</b> as above but very poor recovery, very much broken into mostly pebble sized and rounded pieces (see PHOTO below)	8



39.5-40.5	<b>Andesite</b> as above. Upper part of this interval is quite broken and to some extent altered (to clay like texture); lower part is mostly massive piece that demonstrates dipping ( $\sim 30^\circ$ ) foliation planes. (See PHOTO above)	80
40.5-43	<b>Andesite</b> as above. Upper part is broken into rubble, lower part more massive pieces demonstrating dipping foliation planes. ( $\sim 30^\circ$ )	40
43-45.5	<b>Andesite</b> as above. Upper part is broken into rubble, lower part more massive pieces demonstrating dipping foliation planes. ( $\sim 30^\circ$ )	40
45.5-48	Same as above	40

48-50.5	Same as above	40
50.5-55	<b>Andesite</b> same description but this section intensely broken and rubbleized into pebble to small cobble sized, rounded pieces.	25
55.5-57	<b>Andesite</b> as above but broken into pebble to small cobble sized pieces, rounded by coring action.	40
57-60.5	As above	25
60.5-63.5	As above	50
63.5-65.5	NR	0
65.5-70.5	<b>Andesite</b> as above, but broken into mostly pebble to large pebble sized, rounded pieces.	20
70.5-75.5	Same as above but one coherent piece 3" in thickness.	20
75.5-80.5	Same as above but one coherent piece 4" in thickness.	20
80.5-85.5	Same as above but bottom piece is a coherent, full piece of core that is 7" long	45
85.5-87.5	<b>Andesite</b> as above but one 3" coherent piece at top, rest is pebble to cobble sized rounded pieces.	25
87.5-90.5	<b>Andesite</b> as above but broken into pebble to small cobble sized pieces, rounded by coring action.	25
90.5-93.5	<b>Andesite</b> as above but broken into pebble to small cobble sized pieces, rounded by coring action.	25
93.5-95.5	<b>Andesite</b> as above broken into rounded pebble to small cobble sized pieces.	40
95.5-98.5	Same as above	30
98.5-100	Same as above.	25
100-100.5	Same as above.	80
100.5-105.5	Same as above but lowermost portion is small pieces of <b>andesite</b> bound by what appears to be <b>andesite weathered to clay</b> .	35
105.5-110.5	<b>Andesite</b> as above, broken into pebble to small cobble sized rounded pieces. One 3" coherent piece at base.	20
110.5-112.5	NR	0
112.5-115.5	<b>Andesite</b> as above but again bottom most recovered sample appears to be pieces of andesite bound together by clay from weathered andesite	33
115.5-118	<b>Andesite</b> as above, broken into pebble to small cobble sized rounded pieces.	25
118-119	<b>Andesite</b> as above, broken into pebble to small cobble sized rounded pieces. Two pieces at bottom that are largely coherent, on 3" long, second 2".	50
119-120.5	NR	0
120.5-125.5	<b>Andesite</b> as above, broken into rounded pieces	10
125.5-126	<b>Andesite</b> as above, broken into rounded pieces	75
126-127.5	<b>Andesite</b> as above, broken into rounded pieces	40
127.5-130.5	<b>Andesite</b> as above, broken into rounded pieces	33

130.5-135.5	<b>Andesite</b> as above, broken into rounded pieces	30
135.5-140.5	<b>Andesite</b> as above, broken into rounded pieces. There is a single large rounded pebble (1.5") of very well lithified <b>conglomerate</b> sitting at the base of this interval (though everything is loose, so isn't necessarily from the base of the interval); <b>Photo 0049</b> . Dave Adams considers this evidence that the conglomerate is present here beyond just as a loose clast - I think this is unlikely but can not rule out the possibility. Dave cut the sample and it is seen in the photo below, and in the core box photo, also below, immediately above the 140.5' marker, immediately above the beginning of the clay-claystone section.	20
		
140.5-143	<b>Clay-claystone</b> , dark gray, some is a bit silty (gritty texture in mouth). Very homogenous in appearance; no obvious bedding surfaces. 3" above base there a 3-4" section has small fossils (small shells?) in the clay. The bottom 3" section is a bit lighter in color and has a lot of sand grains: clear quartz (?) & dark andesite?? grains? Still mostly a clay matrix. (see PHOTO above of core box, and larger PHOTO of core box below))	100



143-145.5	<p><b>Clay-claystone</b>, dark gray, silty (gritty texture in mouth). There are scattered clasts in the upper 6" of what appear to be andesite; up to 1" in size. Below that there is at least a 6" zone that has small white, thin features that appear to be cross sections of small shells (fossils) &lt;1/8" in length. Some are curved, some are cross sections of what appear to be small chambers.</p>	100
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145.5-150.5	Poorly consolidated gray <b>Siltstone</b> , some clay; grains are sub-angular to sub-rounded, predominatly quartz but 2-4% black (andesite?) grains. Easily gouged with finger nail, grains wash loose with squirt bottle. Appears to have subtle texture, possible bedding. <b>Grades downward</b> into ever more clay rich silty gray <b>clay</b> that constitutes bottom 2.5' of this interval.	100
150.5-151	More than the 6" stated for interval of same silty gray <b>clay-claystone</b> . Appear to be small white fossil shells(?) in cross section on core face (curved, thin, fragments, perhaps one gastropod cross section?) (see PHOTO below)	150!!!



151-155.5

Gray, silty **clay-claystone**, can be scratched by finger nail though it is very coherent. Quite fossil rich, white curvi-linear shape of shells, possible ostracods(?) (see PHOTO of core box below). ~1.5' down there is very evident bedding that has a dip of ~30° relative to the core axis; discrete layer of white curvi-linear feature appears to be fossil lag? associated with thin (<1/4") **siltstone** zones that appear to fine upward. (see 2nd PHOTO below). Below to base of this section bedding not readily apparent, much less silt, purer clay that also has no apparent fossils in it.

100





155.5-  
159.3

Gray silty **clay-claystone** readily scratched by finger nail (see core box PHOTO above). Bedding not apparent but occasional fossil fragments, one large one nearly 1" in length (1st PHOTO below). Just below large fossil is pebble of sub-angular light SS ? (see 2nd PHOTO below). Same gray silty **clay-claystone** for next almost 2' then zone with abundant small fossils (see 3rd PHOTO below), and just below that a steeply dipping zone of white angular debris that are soft enough to scratch with knife blade (calcareous?) They form a very apparent surface at about 35° to the core axis (see 4th PHOTO below). Just above ~158' is zone with apparent bedding dipping perhaps 20°-30° , abundant small white fossils and a cross section of one large thin shell??. Below that similar core, occasional fossil to base.

100









159.3-  
160.5

Dark gray **silty clay-claystone**; bedding dipping at  $\sim 25^\circ$ . Appears to have very fine white (calcareous?) veins shot through the upper 3"-4", with small pebble sized angular white calcareous? Clasts at very top (can be scratched by knife blade) (see PHOTO below). Lower part similar but no large clasts and calcareous veins not evident.

100



160.5-  
165.5

(see PHOTO of core box, below) Upper 15" is dark gray, **silty clay-claystone** with occasional white fossil fragment and small SS size to small pebble sized clasts that I can't identify but which can be scratched with knife blade (see 2nd PHOTO below). Below ~161.7' core grades into slightly **clayey siltstone to very fine grained sandstone**; well sorted, sub-angular-sub-rounded grains, predominantly quartz but a few % very black grains; moderately consolidated, can be scratched with fingernail, bedding not readily apparent (see 3rd PHOTO below). Below about 163.5' core grades back into silty gray **clay-claystone** to base of interval.

100







165.5-168

Upper 8" is dark gray silty **clay-claystone** that has  $\sim 10-15^\circ$  dip and has fossils; next 2'+ has slightly higher dip bedding and what appear to be small to large fossil cross sections (PHOTOS). Some beds are quite silty, back to clay, back to silty clay. Same **very fine grained sandstone to siltstone** at base; same sub-round to sub-angular quartz with 2-3% very black grains. (see 2 PHOTOS below)

100





168-170.5	<p>(see core box PHOTO below) Upper 3" is <b>very fine grained quartz Sandstone</b> of quartz with ~4-5% black grains; very well sorted, moderate lithification - requires knife blade to make significant scratch. But this appears to have been disturbed and mixed up with mudstone, as though injected with the clay; soft-sediment deformation? There is a steeply dipping surface, perhaps 60° above what then is a dark gray silty mudstone below; this surface is undular, suggests perhaps this might be <u>some kind of slump deposit?</u> (see 2nd PHOTO below). Silty dark <b>clay-claystone</b> below has small to large (pebble sized) clasts of the SS &amp; other angular lithic fragments (see 3rd PHOTO below). At about 170' a rapid transition to the very fine grained <b>SS - Siltstone</b> (same description as above) (see 4th PHOTO below). Then same to base of interval.</p>	100
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170.5-175	<p>(see core box PHOTO above) Light gray, very fine grained, well sorted <b>sandstone</b>; predominantly quartz, 3-5% black grains, sub-rounded all the way down to 174'; able to be scratched with finger nail, so moderately lithified. Appears to be alternating beds that change by percent of black grains (more, less; so cleaner / dirtier) that dip at <math>\sim 10-15^\circ</math> to core axis; thickness of beds from 1"-2" to less than 1/4" (see PHOTO below). At <math>\sim 174'</math> a rather quick transition back into silty, dark gray <b>clay-claystone</b>.</p>	100
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175-176.8	Same dark gray <b>silty clay-claystone</b> ; massive, no obvious bedding or clasts of any kind.	100
176.8-180	Dark gray <b>silty clay-claystone</b> with weak evidence of gently dipping bedding. Appear to be several large, white, curvi-linear fossil fragments (see PHOTO below)	100



180-185	Dark gray <b>silty clay-claystone</b> with limited evidence of low angle bedding (5 <sup>0</sup> ?). Multiple cross sections of small to large fossil shells (see PHOTO below of core box). Can be scratched with finger nail but is better lithified, even a bit brittle in nature.	100
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185-190	<p>Dark gray <b>silty clay-claystone</b> with some thin white calcite veins in upper part? There are occasional 1/4" to 1" zones that appear to be a fossil hash, collection of fossil shells and fragments large and small (see core box PHOTO below); bedding appears to be dipping fairly steeply at 20°-30° with respect to core axis (see 2nd photo PHOTO below)</p>	100
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190-193 Still dark gray **silty clay-claystone** with quite apparent bedding that is dipping fairly steeply at  $20^{\circ}$ - $30^{\circ}$  with respect to core axis (see core box PHOTO above). The visible slightly lighter beds are **siltstone** layers of the same quartz predominant texture and nature. At  $\sim 192'$  there are some beds with abundant fossils, a bit deeper are some layers that appear to have calcite veins in them, parallel to the dipping beds.

100

193-195

Dark gray **silty clay-claystone** inter-layered with gray **siltstone** (see core box PHOTO below); this is finely bedded and dipping as interval above (see 2nd PHOTO below). In lower 1' the above grades into the gray very fine grained quartz **sandstone** (as in above intervals) to siltstone; same 3-5% black grains, same very well sorted, sub-round to sub-angular.

100





195-200	Light gray <b>siltstone</b> to very fine grained <b>sandstone</b> all the way to TD. Same very well sorted quartz with 3-5% black grains, same sub-rounded to sub-angular nature. Can scratch with finger nail. Bedding not very apparent, but core in this interval is quite muddy and I have nearly run out of water in my squirt bottle to clean it!	100
<b>TOTAL DEPTH</b>		