



**LITHOLOGIC DESCRIPTIONS FOR  
SAMPLES OBTAINED FROM BOREHOLES**

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**LOG A-1. LITHOLOGIC DESCRIPTIONS FOR SPLIT-SPOON SAMPLES  
BOREHOLE A, LOWER SANTA CRUZ RIVER**

<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
<u>RECENT ALLUVIUM</u>	
15-16	<b>SANDY GRAVEL</b> ; red-brown; gravel 60%, very fine to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 1 1/2-inch diameter; igneous and metamorphic rocks 60%; quartz and feldspar 25%; volcanic rocks 15%. Reaction to acid: weak.
20-21	<b>SANDY GRAVEL</b> ; white-tan; gravel 70%, very fine to very coarse sand 30%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to well-rounded granules, pebbles, and cobbles to 3-inch diameter; igneous and metamorphic rocks 60%; quartz and feldspar 20%; sedimentary rocks 10%; volcanic rocks 10%. Reaction to acid: strong.
25-26	<b>GRAVELLY SAND</b> ; medium red-brown; very fine to very coarse sand 70%, gravel 30%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 2-inch diameter; volcanic rocks 60%; quartz and feldspar 20%; igneous and metamorphic rocks 10%; sedimentary rocks 10%. Reaction to acid: moderate.
30-31	<b>SANDY GRAVEL</b> ; medium red-brown; gravel 70%, very fine to very coarse sand 30%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1 1/2-inch diameter; igneous and metamorphic rocks 40%; volcanic rocks 40%; quartz and feldspar 20%; trace sedimentary rocks. Reaction to acid: weak.
35-36	<b>GRAVELLY SAND</b> ; medium red-brown; gravel 60%, very fine to very coarse sand 40%, trace silt and clay; moist; non-lithified. Gravel fraction: subangular to subrounded granules, pebbles, and cobbles to 2 1/2-inch diameter; igneous and metamorphic rocks 50%; volcanic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.
40-41	<b>SANDY GRAVEL</b> ; dark red-brown; gravel 55%, very fine to very coarse sand 40%, silt and clay 5%; moist; non-lithified. Gravel fraction: subangular to subrounded granules, pebbles, and cobbles to 2 1/2-inch diameter; volcanic rocks 60%; igneous and metamorphic rocks 30%; quartz and feldspar 10%; trace sedimentary rocks. Reaction to acid: none.



LOG A-1. LITHOLOGIC DESCRIPTIONS FOR SPLIT-SPOON SAMPLES  
BOREHOLE A, LOWER SANTA CRUZ RIVER  
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<u>DEPTH</u> <u>(feet)</u>	<u>DESCRIPTION</u>
45-46	<b>SANDY GRAVEL</b> ; orange-brown; gravel 50%, very fine to very coarse sand 45%, silt and clay 5%; moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1 1/2-inch diameter; igneous and metamorphic rocks 40%; volcanic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.  <u>FORT LOWELL FORMATION</u>
50-51	No recovery.
55-56	No sample obtained.
60-61	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; orange-brown; very fine to very coarse sand 60%, gravel 30%, silt and clay 10%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: subangular to rounded granules and pebbles to 2-inch diameter; igneous and metamorphic rocks 60%; quartz and feldspar 30%; volcanic rocks 10%. Reaction to acid: none.
65-66	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 60%, very fine to very coarse sand 30%, silt and clay 10%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: subangular to rounded granules and pebbles to 2-inch diameter; igneous and metamorphic rocks 50%; quartz and feldspar 30%; volcanic rocks 20%. Reaction to acid: none.
70-71	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; orange-brown; very fine to very coarse sand 55%, gravel 35%, silt and clay 10%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; igneous and metamorphic rocks 60%; quartz and feldspar 30%; volcanic rocks 10%. Reaction to acid: none.
75-76	<b>SANDY, SILTY AND CLAYEY GRAVEL</b> ; orange; gravel 45%, silt and clay 35%, sand 20%; slightly moist; non-lithified; but matrix is cohesive. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 60%; quartz and feldspar 30%; igneous and metamorphic rocks 10%. Reaction to acid: none.

TOTAL DEPTH DRILLED: 76 FEET

LOG A-2. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE B, LOWER SANTA CRUZ RIVER

<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
	<u>RECENT ALLUVIUM</u>
10-14	<b>SILTY AND CLAYEY SAND</b> ; medium brown; very fine to medium sand 60%, silt and clay 40%, trace gravel; slightly moist; non-lithified. Silt and clay occurs chiefly as thin slightly moist layer. Reaction to acid: weak.
14-16	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; medium red-brown; very fine to very coarse sand 55%, gravel 30%, silt and clay 15%; slightly moist; non-lithified, but matrix is somewhat cohesive. Gravel fraction: subangular to subrounded granules and pebbles to 1 1/2-inch diameter; volcanic rocks 70%; quartz and feldspar 30%. Reaction to acid: none.
16-30	<b>SANDY GRAVEL</b> ; medium red-brown; gravel 65%, very fine to very coarse sand 30%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 60%; quartz and feldspar 30%; igneous and metamorphic rocks 10%. Reaction to acid: none.
30-32	<b>SANDY GRAVEL</b> ; medium red-brown; gravel 55%; very fine to very coarse sand 40%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1 1/2-inch diameter; volcanic rocks 60%; quartz and feldspar 30%; igneous and metamorphic rocks 10%. Reaction to acid: weak.
32-34	<b>GRAVELLY SILTY AND CLAYEY SAND</b> ; medium red-brown; very fine to very coarse sand 50%, silt and clay 40%, gravel 10%; slightly moist; non-lithified. Silt and clay clumps. Gravel fraction: subangular to rounded granules and pebbles to 1/4-inch diameter. Reaction to acid: none.
34-36	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; medium orange-brown; very fine to very coarse sand 60%, gravel 30%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; volcanic rocks 60%; quartz and feldspar 30%; igneous and metamorphic rocks 10%. Reaction to acid: none.



LOG A-2. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE B, LOWER SANTA CRUZ RIVER  
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<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
36-46	<b>SANDY GRAVEL</b> ; light orange-brown; gravel 60%, very fine to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 2-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.
46-50	<b>SANDY GRAVEL</b> ; medium orange-brown; gravel 50%, very fine to very coarse sand 45%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 2-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.
	<b><u>FORT LOWELL FORMATION</u></b>
50-60	<b>GRAVELLY SAND</b> ; medium orange-brown; very fine to very coarse sand 50%, gravel 45%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 4-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%. 54-56 feet: cobbles to 4-inch diameter, decreased clay content. Reaction to acid: none.
60-61 (split-spoon) <sup>a</sup>	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; orange-brown; very fine to very coarse sand 50%, gravel 40%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1 1/2-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.
60-62	<b>GRAVELLY SAND</b> ; orange-brown; very fine to very coarse sand 55%, gravel 40%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1 1/2-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.
62-64	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; dark orange-brown; very fine to very coarse sand 55%, gravel 35%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1 1/2-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.



LOG A-2. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE B, LOWER SANTA CRUZ RIVER  
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DEPTH (feet)	DESCRIPTION
64-70	<b>GRAVELLY SAND</b> ; light orange-brown; very fine to very coarse sand 50%, gravel 45%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%; increase clay at 66 feet. Reaction to acid: none.
70-84	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; dark orange-brown; very fine to very coarse sand 50%, gravel 40%, silt and clay 10%; slightly moist; non-lithified. Sand is chiefly medium to coarse-grained. Gravel fraction: granules and pebbles to 1 1/2-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.
84-86	<b>SANDY GRAVEL</b> ; light orange-brown; gravel 60%, very fine to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to well-rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.
86-90	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; dark orange-brown; gravel 55%, very fine to very coarse sand 35%, silt and clay 10%; slightly moist; non-lithified. Sand is chiefly coarse to very coarse-grained. Gravel fraction: subangular to well-rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.
90-92	<b>SANDY GRAVELLY SILT AND CLAY</b> ; dark orange-brown; silt and clay 45%, gravel 30%, very fine to very coarse sand 25%; slightly moist; non-lithified. Sand is chiefly very fine-grained and very coarse-grained. Reaction to acid: none.
92-94	<b>GRAVELLY SANDY SILT AND CLAY</b> ; dark orange-brown; silt and clay 60%, very fine to very coarse sand 30%, gravel 10%; slightly moist; non-lithified. Sand is chiefly very fine to fine-grained. Reaction to acid: none.
94-98	<b>SANDY GRAVEL</b> ; medium orange-brown; gravel 50%, very fine to very coarse sand 45%, silt and clay 5%; very slightly moist; non-lithified. Gravel fraction: subangular to well-rounded granules and pebbles to 1 1/2-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.



LOG A-2. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE B, LOWER SANTA CRUZ RIVER  
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DEPTH (feet)	DESCRIPTION
98-108	<b>SANDY GRAVEL</b> ; light orange-gray; gravel 55%, very fine to very coarse sand 45%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to well-rounded granules, pebbles, and cobbles 2 1/2-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.
108-110	<b>SILTY AND CLAYEY SAND</b> ; medium orange; very fine to medium sand 60%, silt and clay 40%, trace gravel; slightly moist; non-lithified. Reaction to acid: none.
110-111 (split-spoon)	<b>SILTY AND CLAYEY SAND</b> ; medium orange; very fine to fine sand 60%, silt and clay 40%, trace gravel; slightly moist; non-lithified. Reaction to acid: none.
110-116	<b>SILTY AND CLAYEY SAND</b> ; dark orange-brown; very fine to very coarse sand 70%, silt and clay 30%, trace gravel; slightly moist; non-lithified. Reaction to acid: none.
116-120	<b>SAND</b> ; light orange-gray; very fine to medium sand 90%, silt and clay 5%, gravel 5%; slightly moist; non-lithified. Reaction to acid: none.
120-122	<b>SANDY GRAVEL</b> ; medium orange-brown; gravel 50%, very fine to very coarse sand 45%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: granules and pebbles to 1/2-inch diameter; volcanic rocks 50%; quartz and feldspar 40%; igneous and metamorphic rocks 10%. Reaction to acid: none.
122-126	<b>SILTY AND CLAYEY SAND</b> ; medium orange-brown; very fine to fine sand 75%, silt and clay 20%, gravel 5%; slightly moist; non-lithified. Reaction to acid: none.
126-130	<b>SILTY AND CLAYEY SAND</b> ; dark orange-brown; very fine to fine sand 60%, silt and clay 40%, trace gravel; very slightly moist; non-lithified. Increasing clay content with depth. Reaction to acid: none.
130-132	<b>SANDY SILT AND CLAY</b> ; dark orange-brown; silt and clay 60%, very fine to fine sand 40%, trace gravel; moist; non-lithified. Reaction to acid: none.
132-134	<b>SANDY SILT AND CLAY</b> ; dark orange-brown; silt and clay 60%, very fine to fine sand 35%, gravel 5%; moist; non-lithified. Reaction to acid: none.



LOG A-2. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE B, LOWER SANTA CRUZ RIVER  
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<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
134-136	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; dark orange-brown; very fine to very coarse sand 50%, silt and clay 25%, gravel 25%; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 1/2-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.
136-148	<b>SANDY GRAVEL</b> ; light orange-brown; gravel 60%, very fine to very coarse sand 35%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to well-rounded granules and pebbles to 2-inch diameter; volcanic rocks 40%; quartz and feldspar 30%; igneous and metamorphic rocks 30%. Reaction to acid: none.
148-150	<b>SANDY GRAVEL</b> ; light orange-brown; gravel 60%; very fine to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to well-rounded granules and pebbles to 2-inch diameter; volcanic rocks 40%; quartz and feldspar 30%; igneous and metamorphic rocks 30%. Reaction to acid: none.

**TOTAL DEPTH DRILLED: 150 FEET**

<sup>a</sup> Sample obtained from brass-sleeve bearing split-spoon sampler driven using 140-pound hammer.

LOG A-3. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE C, LOWER SANTA CRUZ RIVER

<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
<u>RECENT ALLUVIUM</u>	
15-20	<b>GRAVELLY SILTY AND CLAYEY SAND</b> ; brown; very fine to very coarse sand 50%, silt and clay 30%, gravel 20%; slightly moist; non-lithified. Silt and clay occurs chiefly in thin layers. Reaction to acid: strong.
23-30	<b>SANDY GRAVEL</b> ; brown; gravel 65%, very fine to very coarse sand 35%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to well-rounded granules, pebbles, and cobbles to 5-inch diameter; volcanic rocks 70%; quartz and feldspar 20%; igneous and metamorphic rocks 10%. Reaction to acid: strong.
35-40	<b>SANDY GRAVEL</b> ; orange-brown; gravel 65%, very fine to very coarse sand 35%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to well-rounded granules, pebbles, and cobbles to 5-inch diameter; volcanic rocks 70%; quartz and feldspar 20%; igneous and metamorphic rocks 10%. Reaction to acid: none.
40-54	<b>SANDY GRAVEL</b> ; dark red-brown; gravel 60%, very fine to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 5-inch diameter; volcanic rocks 50%; quartz and feldspar 30%; igneous and metamorphic rocks 20%. Reaction to acid: none.
<u>FORT LOWELL FORMATION</u>	
54-75	<b>SANDY GRAVEL</b> ; dark orange-brown; gravel 60%, very fine to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.
59-60 (split-spoon) <sup>a</sup>	<b>SANDY GRAVEL</b> ; orange; gravel 55%, very fine to very coarse 40%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar. Reaction to acid: none.



LOG A-3. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE C, LOWER SANTA CRUZ RIVER  
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<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
75-79	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; dark orange-brown; very fine to very coarse sand 50%, gravel 30%; silt and clay 20%; moist, non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 1-inch diameter. Reaction to acid: none.
79-80 (split-spoon)	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; dark orange-brown; gravel 50%, very fine to very coarse sand 30%, silt and clay 20%; moist; non-lithified, but matrix is cohesive. Abundant weathering products. Reaction to acid: none.
79-97	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange; gravel 50%, very fine to very coarse sand 40%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: cobbles and pebbles to 2-inch diameter; volcanic rocks 50%; quartz and feldspar 30%; igneous and metamorphic rocks 20%. Reaction to acid: none.
89-90 (split-spoon)	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange; gravel 50%, very fine to very coarse sand 40%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: cobbles and pebbles to 2-inch diameter; volcanic rocks 50%; quartz and feldspar 30%; igneous and metamorphic rocks 20%. Reaction to acid: none.
97-99	<b>SANDY SILT AND CLAY</b> ; dark orange-brown; silt and clay 60%, very fine to fine sand 40%; moist; non-lithified. Reaction to acid: none.
99-100 (split-spoon)	<b>GRAVELLY SILTY AND CLAYEY SAND</b> ; dark orange-brown; very fine to very coarse sand 50%, silt and clay 30%, gravel 20%; slightly moist; non-lithified. Upper part of interval is sandy silt and clay; lower part of interval is silty and clayey gravelly sand. Reaction to acid: none.
99-105	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange; gravel 50%, very fine to very coarse sand 40%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: cobbles and pebbles to 2-inch diameter; volcanic rocks 50%; quartz and feldspar 30%; igneous and metamorphic rocks 20%. Reaction to acid: none.
105-115	<b>SANDY GRAVEL</b> ; dark orange-brown; gravel 55%, very fine to very coarse sand 40%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to well-rounded granules, pebbles and cobbles to 3-inch diameter; volcanic rocks 60%; quartz and feldspar 30%; igneous and metamorphic rocks 10%. Reaction to acid: none.



**LOG A-3. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE C, LOWER SANTA CRUZ RIVER  
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<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
115-120	<b>GRAVELLY SAND</b> ; medium orange-brown; medium to very coarse sand 75%, gravel 20%, silt and clay 5%; slightly moist; non-lithified. Rare pebbles and cobbles. Reaction to acid: none.
120-134	<b>SANDY GRAVEL</b> ; medium orange-brown; gravel 60%; very fine to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1.5-inch diameter; volcanic rocks 60%; quartz and feldspar 30%; igneous and metamorphic rocks 10%. Reaction to acid: none.
134-149	<b>GRAVELLY SAND</b> ; medium orange-brown; very fine to very coarse sand 90%, gravel 10%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: granules, pebbles, and cobbles to 3-inch diameter. Reaction to acid: none.
149-150 (split-spoon)	<b>SAND</b> ; grey-brown; very fine to fine sand 100%, trace silt and clay; slightly moist; non-lithified. Reaction to acid: none.

**TOTAL DEPTH DRILLED: 150 FEET**

<sup>a</sup> Sample obtained from brass-sleeve bearing split-spoon sampler driven using 140-pound hammer.

**LOG A-9. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE I, LOWER SANTA CRUZ RIVER**

<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
<u>RECENT ALLUVIUM</u>	
0-4	<b>SAND</b> ; light brown; very fine to medium sand 95%, silt and clay 5%, trace gravel; slightly moist; non-lithified. Reaction to acid: moderate.
4-14	<b>SANDY SILT AND CLAY</b> ; medium brown; silt and clay 60%, very fine to fine sand 40%; non-lithified. Reaction to acid: strong.
14-20	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; dark red-brown; very fine to very coarse sand 60%, gravel 30%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: subangular to well-rounded granules and pebbles to 1 1/2-inch diameter. Reaction to acid: weak.
20-21 (split-spoon) <sup>a</sup>	<b>SANDY GRAVEL</b> ; tan-brown; gravel 60%, very fine to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: angular to rounded granules and pebbles to 1 1/2-inch diameter; volcanic rocks 60%; igneous and metamorphic rocks 20%; quartz and feldspar 10%. Reaction to acid: weak.
20-46	<b>SANDY GRAVEL</b> ; medium red-brown; gravel 60%, very fine to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: angular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 60%; igneous and metamorphic rocks 15%; quartz and feldspar 15%. Reaction to acid: moderate.
<u>FORT LOWELL FORMATION</u>	
46-60	<b>SANDY GRAVEL</b> ; medium orange-brown; gravel 55%, very fine to very coarse sand 40%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 2-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%; trace sedimentary rocks. Reaction to acid: none.
60-61 (split-spoon)	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 55%, very fine to very coarse sand 35%, silt and clay 10%; slightly moist; non-lithified, but matrix is cohesive; abundant weathering products. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%; trace sedimentary rocks. Reaction to acid: none.



LOG A-9. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE I, LOWER SANTA CRUZ RIVER  
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DEPTH (feet)	DESCRIPTION
60-74	<b>SANDY GRAVEL</b> ; dark red-brown; gravel 60%, very fine to very coarse sand 35%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.
74-88	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; dark red-brown; gravel 55%, very fine to very coarse sand 35%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.
88-90	<b>SANDY SILT AND CLAY</b> ; dark orange-brown; silt and clay 60%, very fine to fine sand 40%, trace gravel; slightly moist; non-lithified. Reaction to acid: none.
90-92	<b>SILTY AND CLAYEY SAND</b> ; dark orange-brown; very fine to very coarse sand 55%, silt and clay 40%, gravel 5%; very slightly moist; non-lithified. Sand chiefly very fine- to medium-grained. Reaction to acid: none.
92-96	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; dark orange-brown; very fine to very coarse sand 60%, gravel 30%, silt and clay 10%; very slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1/2-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.
96-98	<b>SANDY GRAVEL</b> ; orange-brown; gravel 60%, very fine to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1 1/2-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.
98-100	<b>GRAVELLY SAND</b> ; orange-brown; very fine to very coarse sand 60%, gravel 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1 1/2-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.



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<b>DEPTH (feet)</b>	<b>DESCRIPTION</b>
100-106	<b>SILTY AND CLAYEY SAND</b> ; medium orange-brown; very fine to very coarse sand 75%; silt and clay 20%, gravel 5%; slightly moist; non-lithified. Sand is chiefly fine-grained. Reaction to acid: none.
106-108	<b>GRAVELLY SAND</b> ; medium orange-brown; very fine to very coarse sand 55%, gravel 40%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 1 1/2-inch diameter; igneous and metamorphic rocks 50%; volcanic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.
108-112	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; orange-brown; very fine to very coarse sand 60%, gravel 30%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 1-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.
112-116	<b>SANDY GRAVEL</b> ; light orange-brown; gravel 70%, very fine to very coarse sand 30%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 1-inch diameter; volcanic rocks 45%; igneous and metamorphic rocks 45%; quartz and feldspar 10%; Reaction to acid: none.
116-120	<b>SILTY AND CLAYEY SAND</b> ; medium orange-brown; very fine to very coarse sand 55%; silt and clay 40%, gravel 5%; slightly moist; non-lithified. Reaction to acid: none.
120-121 (split-spoon)	<b>SILTY AND CLAYEY SAND</b> ; medium orange-brown; very fine to very coarse sand 65%, silt and clay 35%, trace gravel; slightly moist; non-lithified. Reaction to acid: none.
120-124	<b>SILTY AND CLAYEY SAND</b> ; medium orange-brown; very fine to very coarse sand 60%, silt and clay 40%, trace gravel; slightly moist; non-lithified. Sand is chiefly very fine- to fine-grained. Reaction to acid: none.
124-132	<b>SANDY SILT AND CLAY</b> ; dark orange-brown; silt and clay 60%, very fine to very coarse sand 40%; moist; non-lithified. Sand is chiefly very fine- to fine-grained. Reaction to acid: none.



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<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
130-131 (split-spoon)	<b>SANDY SILT AND CLAY</b> ; dark orange-brown; silt and clay 60%, very fine to very coarse sand 40%; moist; non-lithified. Sand is chiefly very fine- to fine-grained. Reaction to acid: none.
132-140	<b>SANDY SILT AND CLAY</b> ; dark orange-brown; silt and clay 60%, very fine to very coarse sand 40%; slightly moist; non-lithified. Sand is chiefly very fine- to fine-grained. Reaction to acid: none.
140-146	<b>SILTY AND CLAYEY SAND</b> ; light orange-brown; very fine to very coarse sand 85%, silt and clay 10%, gravel 5%; slightly moist; non-lithified. Silt and clay occurs in thin layer. Reaction to acid: none.
146-150	<b>SANDY SILT AND CLAY</b> ; dark orange-brown; silt and clay 60%, very fine to very coarse sand 40%, trace gravel; slightly moist; non-lithified. Sand is chiefly very fine- to fine-grained. Reaction to acid: none.

**TOTAL DEPTH DRILLED: 150 FEET**

<sup>a</sup> Sample obtained from brass-sleeve bearing split-spoon sampler driven using 140-pound hammer.

LOG A-11. LITHOLOGIC DESCRIPTIONS FOR SPLIT-SPOON SAMPLES  
BOREHOLE K, LOWER SANTA CRUZ RIVER

<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
<u>RECENT ALLUVIUM</u>	
3 (drill cuttings) <sup>a</sup>	<b>SAND</b> ; medium brown; very fine to medium sand 90%, gravel 5%, silt and clay 5%; slightly moist; non-lithified. Reaction to acid: strong.
9.5 (drill cuttings)	<b>GRAVELLY SAND</b> ; medium brown; very fine to very coarse sand 80%, gravel 15%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1/4-inch diameter; quartz and feldspar 50%; volcanic rocks 30%; igneous and metamorphic rocks 20%; trace sedimentary rocks. Reaction to acid: moderate.
14-15	<b>GRAVELLY, SILTY AND CLAYEY SAND</b> ; medium red-brown; very fine to very coarse sand 45%, silt and clay 35%, gravel 20%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; igneous and metamorphic rocks 50%; volcanic rocks 30%; quartz and feldspar 20%. Reaction to acid: strong.
20-21	<b>SANDY GRAVEL</b> ; light red-brown; gravel 55%, very fine to very coarse sand 45%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 2-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 30%; quartz and feldspar 20%; sedimentary rocks 10%. Reaction to acid: strong.
25-26	<b>GRAVELLY SAND</b> ; medium orange-brown; very fine to very coarse sand 50%, gravel 45%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; quartz and feldspar 40%; volcanic rocks 30%; igneous and metamorphic rocks 25%; sedimentary rocks 5%. Reaction to acid: weak.
30-31	<b>GRAVELLY SAND</b> ; medium orange-brown; very fine to very coarse sand 60%, gravel 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; igneous and metamorphic rocks 40%; volcanic rocks 30%; quartz and feldspar 30%; trace sedimentary rocks. Reaction to acid: none.



LOG A-11. LITHOLOGIC DESCRIPTIONS SPLIT-SPOON SAMPLES  
BOREHOLE K, LOWER SANTA CRUZ RIVER  
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<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
35-36	<b>SANDY GRAVEL</b> ; medium orange-brown; gravel 60%, very fine to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles, and cobbles to 2 1/2-inch diameter; igneous and metamorphic rocks 40%; volcanic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.
40-41	<b>SANDY GRAVEL</b> ; medium orange-brown; gravel 55%, very fine to very coarse sand 45%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 2 1/2-inch diameter; volcanic rocks 50%; quartz and feldspar 30%; igneous and metamorphic rocks 20%. Reaction to acid: none.
45-46	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; medium orange-brown; very fine to very coarse sand 50%, gravel 40%, silt and clay 10%; slightly moist; non-lithified, but matrix is somewhat cohesive. Gravel fraction: subangular to rounded granules and pebbles to 1 1/2-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%; trace sedimentary rocks. Reaction to acid: none.
50-51	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; medium orange-brown; gravel 50%, very fine to very coarse sand 40%, silt and clay 10%; slightly moist; non-lithified, but matrix is somewhat cohesive. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 2 1/2-inch diameter; volcanic rocks 40%; igneous and metamorphic rocks 40%; quartz and feldspar 20%; trace sedimentary rocks. Reaction to acid: none.
<u>FORT LOWELL FORMATION</u>	
55-56	<b>SANDY GRAVEL</b> ; light orange-brown; very fine to very coarse sand 60%, gravel 35%, silt and clay 5%; slightly moist; non-lithified, but matrix is somewhat cohesive. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; quartz and feldspar 40%; volcanic rocks 30%; igneous and metamorphic rocks 30%. Reaction to acid: none.
60-61	<b>SANDY GRAVEL</b> ; medium orange-brown; gravel 55%, very fine to very coarse sand 40%, silt and clay 5%; slightly moist; non-lithified, but matrix somewhat cohesive. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; quartz and feldspar 40%; volcanic rocks 30%; igneous and metamorphic rocks 30%. Very poor recovery. Reaction to acid: none.



**LOG A-11. LITHOLOGIC DESCRIPTIONS SPLIT-SPOON SAMPLES  
BOREHOLE K, LOWER SANTA CRUZ RIVER  
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<b>DEPTH (feet)</b>	<b>DESCRIPTION</b>
65-66	No recovery.
70-71	No recovery.

**TOTAL DEPTH DRILLED: 71 FEET**

<sup>a</sup> Drill cuttings obtained from auger flights.

**LOG A-12. LITHOLOGIC DESCRIPTIONS FOR SPLIT-SPOON SAMPLES  
BOREHOLE L, LOWER SANTA CRUZ RIVER**

<b>DEPTH (feet)</b>	<b>DESCRIPTION</b>
<b><u>RECENT ALLUVIUM</u></b>	
14.5-15.5	<b>SANDY GRAVEL</b> ; red-brown; gravel 55%, very fine to very coarse sand 45%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 2-inch diameter; volcanic rocks 45%; igneous and metamorphic rocks 40%; quartz and feldspar 15%. Reaction to acid: none.
20-21	<b>SANDY GRAVEL</b> ; light brown; gravel 55%, very fine to very coarse sand 45%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 2 1/2-inch diameter; igneous and metamorphic rocks 45%; volcanic rocks 35%; quartz and feldspar 20%. Reaction to acid: none.
25-26	<b>GRAVELLY SAND</b> ; red-brown; very fine to very coarse sand 55%, gravel 45%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; volcanic rocks 60%; igneous and metamorphic rocks 20%; quartz and feldspar 20%. Reaction to acid: none.
30-31	<b>GRAVELLY SAND</b> ; red-brown; very fine to very coarse sand 60%, gravel 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1/2-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.
35-36	<b>GRAVELLY SAND</b> ; red-brown; very fine to very coarse sand 60%, gravel 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; volcanic rocks 60%; igneous and metamorphic rocks 20%; quartz and feldspar 20%. Reaction to acid: none.
40-41	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; red-brown; very fine to very coarse sand 60%, gravel 30%, silt and clay 10%; very slightly moist; non-lithified, but matrix is somewhat cohesive. Gravel fraction: angular to subrounded granules, pebbles, and cobbles to 2 1/2-inch diameter; volcanic rocks 40%; quartzite 30%; quartz and feldspar 20%; igneous and metamorphic rocks 10%. Reaction to acid: none



LOG A-12. LITHOLOGIC DESCRIPTIONS FOR SPLIT-SPOON SAMPLES  
BOREHOLE L, LOWER SANTA CRUZ RIVER  
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<u>DEPTH</u> <u>(feet)</u>	<u>DESCRIPTION</u>
	<u>FORT LOWELL FORMATION</u>
45-46	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; orange-brown; very fine to very coarse sand 60%, gravel 30%, silt and clay 10%; very slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: angular to subrounded granules and pebbles to 1-inch diameter; volcanic rocks 50%; quartz and feldspar 20%; igneous and metamorphic rocks 20%; quartzite 10%. Reaction to acid: none.
50-51	<b>SILTY AND CLAYEY GRAVELLY SAND</b> ; orange-brown; very fine to very coarse sand 60%, gravel 30%, silt and clay 10%; very slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: angular to subrounded granules and pebbles to 1-inch diameter; volcanic rocks 50%; quartz and feldspar 20%; igneous and metamorphic rocks 20%; quartzite 10%. Reaction to acid: none.
55-56	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 60%, very fine to very coarse sand 25%, silt and clay 15%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: angular to subrounded granules, pebbles, and cobbles to 2 1/2-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 20%; quartz and feldspar 20%; quartzite 10%. Reaction to acid: none.
57-58	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 65%, very fine to very coarse sand 25%, silt and clay 10%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: angular to subrounded granules, pebbles, and cobbles to 2 1/2-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 20%; quartz and feldspar 20%; quartzite 10%. Reaction to acid: none.

TOTAL DEPTH DRILLED: 58 FEET

LOG A-13. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE M, LOWER SANTA CRUZ RIVER

<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
<u>RECENT ALLUVIUM</u>	
10-14	<b>SANDY GRAVEL</b> ; light red-brown; gravel 65%, very fine to very coarse sand 35%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 1-inch diameter; quartz and feldspar 70%; igneous and metamorphic rocks 20%; volcanic rocks 10%. Reaction to acid: none.
14-32	<b>SANDY GRAVEL</b> ; light red-brown; gravel 75%, very fine to very coarse sand 25%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules, pebbles, and cobbles to 5-inch diameter; quartz and feldspar 60%; igneous and metamorphic rocks 25%; volcanic rocks 15%. Reaction to acid: none.
<u>FORT LOWELL FORMATION</u>	
32-34	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 65%, medium to very coarse sand 25%, silt and clay 10%; slightly moist; non-lithified, but matrix is somewhat cohesive. Gravel fraction: granules and pebbles to 1 1/2-inch diameter; quartzite 50%; volcanic rocks 40%; quartz and feldspar 10%. Reaction to acid: none.
34-40	<b>SANDY GRAVEL</b> ; orange-brown; gravel 65%, very fine to very coarse sand 35%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: granules and pebbles to 2-inch diameter; volcanic rocks 70%; quartzite 20%; quartz and feldspar 10%. Reaction to acid: none.
40-41 (split-spoon) <sup>a</sup>	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 60%, very fine to very coarse sand 30%, silt and clay 10%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.
40-44	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 60%, very fine to very coarse sand 30%, silt and clay 10%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 20%. Reaction to acid: none.



**LOG A-13. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE M, LOWER SANTA CRUZ RIVER  
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<b>DEPTH (feet)</b>	<b>DESCRIPTION</b>
44-48.5	<b>SANDY GRAVEL</b> ; orange-brown; gravel 70%, very fine to very coarse sand 30%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 50%; igneous and metamorphic rocks 30%; quartz and feldspar 10%; quartzite 10%. Reaction to acid: none.
48.5	<b>GRAVELLY SAND</b> ; orange-brown; fine to coarse sand 85%, gravel 15%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 1/2-inch diameter; volcanic rocks 60%; igneous and metamorphic rocks 25%; quartz and feldspar 15%. Reaction to acid: none.
48.5-52	<b>SANDY GRAVEL</b> ; orange-brown; gravel 75%, very fine to very coarse sand 25%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 70%; igneous and metamorphic rocks 20%; quartzite, quartz, and feldspar 10%. Reaction to acid: none.
50-51 (split-spoon)	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 50%, fine to coarse sand 35%, silt and clay 15%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: granules and pebbles to 2-inches diameter; volcanic rocks 75%; igneous and metamorphic rocks 15%; quartz and feldspar; trace sedimentary. Reaction to acid: none.
52-58	<b>SANDY GRAVEL</b> ; orange brown; gravel 65%, fine to coarse sand 30%, silt and clay 5%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: subangular to sub-rounded granules and pebbles to 1-inch; volcanic rocks 70%; quartzite 15%; igneous and metamorphic rocks 10%; quartz and feldspar 5%. Reaction to acid: none.
58-64	<b>GRAVELLY SANDY SILT AND CLAY</b> ; orange-brown; silt and clay 50%, very fine to fine sand 40%, gravel 10%; slightly moist; non-lithified, but matrix is somewhat cohesive. Reaction to acid: none.
60-61 (split-spoon)	<b>GRAVELLY SANDY SILT AND CLAY</b> ; orange-brown; silt and clay 50%, very fine to fine sand 40%, gravel 10%; slightly moist; non-lithified, but matrix is somewhat cohesive. Reaction to acid: none.



LOG A-13. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE M, LOWER SANTA CRUZ RIVER  
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DEPTH (feet)	DESCRIPTION
64-68	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange brown; gravel 70%, fine to medium sand 25%, silt and clay 5%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: subangular to rounded; granules and pebbles to 1 1/2-inch diameter; volcanic rocks 70%; igneous and metamorphic rocks 10%; quartz and feldspar 10%; sedimentary rocks 10%. Reaction to acid: none.
68-80	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 65%, fine to medium sand 25%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 80%; igneous and metamorphic rocks 10%; quartz and feldspar 10%. Reaction to acid: none.
80-90	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 70%; fine to medium sand 25%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; volcanic rocks 80%; igneous and metamorphic rocks 10%; quartzite, quartz, and feldspar 10%. Reaction to acid: none.
90-92	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange brown; gravel 65%, fine to coarse sand 25%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1 1/2-inch diameter; volcanic rocks 80%; igneous and metamorphic rocks 10%; quartzite, quartz, and feldspar 10%. Reaction to acid: none.
92-94	<b>GRAVELLY, SANDY SILT AND CLAY</b> ; orange-brown; silt and clay 50%, medium to coarse sand 30%, gravel 20%; moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 2 1/2-inch diameter. Reaction to acid: none.
94-98	<b>GRAVELLY SAND</b> ; orange-brown; medium to coarse sand 90%; gravel 10%, trace silt and clay; slightly moist; non-lithified, but contains some cohesion. Gravel fraction: sub-rounded to rounded granules to 1/8-inch diameter; quartz and feldspar 80%; volcanic rocks 20%. Reaction to acid: none.
98-100	<b>SILTY AND CLAYEY SAND</b> ; orange-brown; fine to medium sand 60%, silt and clay 40%; trace gravel; slightly moist; non-lithified. Silty and clayey layers alternate with sandy layers. Reaction to acid: none.



LOG A-13. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE M, LOWER SANTA CRUZ RIVER  
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<u>DEPTH (feet)</u>	<u>DESCRIPTION</u>
100-104	<b>SILTY AND CLAYEY SAND</b> ; orange-brown; very fine to fine sand 55%, silt and clay 45%; slightly moist; non-lithified. Reaction to acid: none.
104-110	<b>SANDY SILT AND CLAY</b> ; orange-brown; silt and clay 60%, very fine to fine sand 40%; slightly moist; non-lithified. Reaction to acid: none.
110-111 (split-spoon)	<b>SANDY SILT AND CLAY</b> ; orange-brown; silt and clay 70%, very fine to fine sand 30%; very slightly moist; moderately stiff; non-lithified.
110-114	<b>GRAVELLY SAND</b> ; orange-brown; medium to coarse sand 70%, gravel 30%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; quartz and feldspar 60%; volcanic rocks 20%; granitic and metamorphic rocks 20%. Reaction to acid: none.
114-116	<b>GRAVELLY SAND</b> ; orange-brown; fine to medium sand 60%; gravel 40%; trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1-inch diameter; quartz and feldspar 60%; volcanic rocks 30%; granitic and metamorphic rocks 10%. Reaction to acid: none.
116-118	<b>SANDY GRAVEL</b> ; orange-brown; gravel 65%, very fine to very coarse sand 35%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 1-inch diameter; quartz and feldspar 60%; volcanic rocks 20%; granitic and metamorphic rocks 20%. Reaction to acid: none.
118-120	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 65%, very fine to very coarse sand 30%, silt and clay 5%; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 2-inch diameter; granitic rocks and metamorphic rocks 60%; quartz and feldspar 40%. Reaction to acid: none.



LOG A-13. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
BOREHOLE M, LOWER SANTA CRUZ RIVER  
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<u>DEPTH</u> <u>(feet)</u>	<u>DESCRIPTION</u>
120-121 (split-spoon)	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 60%, very fine to very coarse sand 30%, silt and clay 10%; slightly moist; non-lithified, but matrix is cohesive. Gravel fraction: angular to subrounded granules, pebbles, and cobbles to 2 1/2-inch diameter; metamorphic rocks 60%; granitic rocks 30%; volcanic rocks 10%. Reaction to acid: none.
120-122	<b>SILTY AND CLAYEY SANDY GRAVEL</b> ; orange-brown; gravel 65%, very fine to very coarse sand 25%, silt and clay 10%; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules, pebbles, and cobbles to 2 1/2-inch diameter; metamorphic rocks 50%; granitic rocks 20%; volcanic rocks 20%; quartz and feldspar 10%. Reaction to acid: none.
122-128	<b>GRAVELLY SAND</b> ; orange-brown; fine to coarse sand 85%, gravel 15%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1/2-inch diameter; metamorphic rocks 40%; volcanic rocks 40%; quartz and feldspar 20%. Reaction to acid: none.
128-134	<b>SANDY SILT AND CLAY</b> ; orange-brown; silt and clay 60%, very fine to fine sand 40%; slightly moist; non-lithified. Reaction to acid: none.
134-135	<b>GRAVELLY SAND</b> ; orange-brown; medium to very coarse sand 60%, gravel 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 1/2-inch diameter; quartz and feldspar 40%; metamorphic rocks 30%; volcanic rocks 30%. Reaction to acid: none.
135-142	<b>SANDY GRAVEL</b> ; orange-brown; gravel 60%, very fine to coarse sand 35%, silt and clay 5%; very slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 2-inch diameter; metamorphic rocks 60%; granitic rocks 30%; quartz and feldspar 10%. Reaction to acid: none.
140-141 (split-spoon)	<b>SANDY GRAVEL</b> ; orange-brown; gravel 60%, very fine to coarse sand 35%, silt and clay 5%; very slightly moist; non-lithified. Gravel fraction: subangular to rounded granules and pebbles to 2-inch diameter; metamorphic rocks 60%; granitic rocks 30%; quartz and feldspar 10%. Reaction to acid: none.



**LOG A-13. LITHOLOGIC DESCRIPTIONS FOR DRILL CUTTINGS SAMPLES  
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<b>DEPTH (feet)</b>	<b>DESCRIPTION</b>
142-146	<b>SANDY GRAVEL</b> ; orange-brown; gravel 60%, medium to very coarse sand 40%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to subrounded granules and pebbles to 1 1/2-inch diameter. Gravel fraction: metamorphic rocks 60%; volcanic rocks 30%; quartz and feldspar 10%. Reaction to acid: none.
146-150	<b>SANDY GRAVEL</b> ; orange-brown; gravel 65%, fine to coarse sand 35%, trace silt and clay; slightly moist; non-lithified. Gravel fraction: subangular to rounded granules, pebbles, and cobbles to 3-inch diameter; metamorphic rocks 60%; volcanic rocks 30%; quartz and feldspar 10%. Reaction to acid: none.

**TOTAL DEPTH DRILLED: 150 FEET**

<sup>a</sup> Sample obtained from brass-sleeve bearing split-spoon sampler driven using 140-pound hammer.