GL01915

CLACKAMAS CTGH-1 CORE LOG

Location: Marion Co., Oregon
T85,R8E, Sec. 28
Drilled July-Sept., 1986

Well Head Elevation: 3840 feet
Logged by: Sibbett, UURI, Nov., 86
Page: 1 of 18

GEOLOGIC DESCRIPTIONS

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description
1	527-536	74°,88°,5°	527-550	Olivine Basalt 2% 2mm Xls. Ol. (P) lag. Xenomor, light gray, 1% ≤ 2mm vesicles, myrolitic cavities
2	544	mod. to few 45-90°		Basalt con. 3-5% diktytaxitic cavities, med. xl. text Vesicular flow base starts at 549'
3	552	irregular fract. few 25°, breccia	550-580	Basalt viscular 1/2-2 cm, grayish-red, 10% ≤ 1 mm anh. pheno Plag. & ol., glommupheric, matrix fine grain.
4	562	no sign. alt.		Diktytaxitic cavities.
5	579	pk-brn clay	558-580	Flow breccia, vesicular. Med-gray, flow breccia, vesicular
6	588	few 75°	580-610	Basalt, ves. first 8', ≤ 0.5 cm ves. Med-dark gray nonporph. Fine grain xenomorphic.
7	595.5	mod. 80-90°		Dense flow, vert. joints, few plag. pheno.
8	606.5	mod. 80-90°		Vesicular base starts at 603
9	620	few 80-90°	610-646	Basalt, vesicular top to 618', 1-2 cm ves., Dark gray fine grain. 2% 1mm plag. xls.
10	629	minor fault 60°	625-628	Flow bands horizontal, 624.5 flow base breccia starts to 628. Slicken side, minor clay, fault & flow breccia above.
11	639	few 90-85°		1/2 cm 15% vesicles, pink clay wash-in on fract.
12	648	few 65°		near horiz. flow-band bubble plan. Flow breccia
13	658	few 65° & 90°	646-661	Basalt flow, dark gray, fine, 1/2 cm ves., 25% vesicular top to 653' Xenomorphic, 2% 1 mm plag.
14	675	few 85°-90°	661-683	Basalt flow, & breccia, vesicular 25%, fine grain dk gray-grayish-brn. 1-3 mm ves. clay matrix in brec.
15	693	mod. 80-90°, few 65°	683-711	Basalt flow, v. fine grain, med-dk gray, dusky brn-grayish brn, flow-top breccia 686, ≤ 1 mm ves.
16	701	mod. 60-70° 90°		2% 1mm plag. pheno, anh, few 1-5 mm ves. fractures spaced 2-6 cm
17	710	few 55-60° and 90°		White clay on vert. fract. 0.5 ft. flow breccia base recovered.
18	733	few 70°	711-795	Basalt Flow, ves., fine grain. Grayish red upper flow breccia, gray below 730'
19	743	mod. 80-90°		Brnish-dk gray, ≤ 1 mm ves. abundant. minor clay on fractures spaced 3-6 cm.
20	750	few 60°		V. fine grain, med. gray, clay coat on fractures.
21	760	2 fractures, 30° & 65°		Same as above
22	770	45° & 70°		Xenomorphic, non-porphyritic.
23	785	few 65°	774-	Flow contact, vesicular basalt above & below.

statistical param.	misc. notes
Olivine Basalt average susc. = 863.32 c st. dev = 49.4	uniform Log pgs 1
Basalt/Basalt flows average susc = 917.8 s. dev = 330.6	very uniform throughout Log pages 1-6

Original Datasheets → Howard Ross
reduced orig. data P. Dawber
copy M. Wright

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description Page 2	Basalt / Basaltflows contin.	
24	800	minor clay in ves.	795-815.2	Basalt Flow, vesicular top, dark gray, diktytaxitic 2% 1 mm anh plag. pheno. yel-brn clay on fractures		
25	809	few 80° & 60°		Fault breccia at 811', flow breccia 814-815.2'		
26	817.5	mod. strong 70-90°	815.2-846	Lithic Tuff, yel-gray to pale yel-brn ash	Lithic Tuff	log pages: 6
27	826.5	crush-zone		Light gray to reddish-brn clast., non-welded weak compaction. Lithic-Lapilli tuff.	aver. susc = 804.1	
28	838	few 80°		Blocks to 15 cm. dia., water lain (?) ash 3 cm thick at 837. Andesitic? blocks in lapilli tuff	s dev = 109.2	
29	848.5	broke up	846-1114	~~Andesite? lava flow, gradual contact 840-846~~ fine grain, dk grnish-gray.	Andesite lava flow 1 & 6	uniform throughout not much variation in suscept. log pages: 6-11
30	863	strong 10°		non-porphy, clay coating on flow fract. 2-3 cm sp. flow foliation dipping 10°	aver. susc = 884.6	
31	883.5	mod.-strong 10° flow joints 80°		Andesite (cont.) dk-grn-gray-fine grain. bimodel xls. 20% 1 mm plag. & pyrox/Ol, mag.	s dev = 114.0	
32	883.5	65° 4 cm sp. strong 0-20°		black 1 mm min. on fract. Mn.Ox?		
33	892	mod. 10° & 30°		as above, fractures 3-6 cm spac.		
34	903.5	mod. spec. 10-30° few 80°		pink-grayish orange clay on 80-90' fract.		
35	913	mod. 10-30° & 90°		as above		
36	918.5	10-30°		Andesite Flow continued from 846', fine grained		
37	928	90° fract.		as above, clay on 90° fractures, MnOx on 10-30° fract.		
38	937.5	10-30° strong few 60°		Andesite continued		
39	949	strong 0-20°, 90o		some clay cement breccia, slickesides-20° dip. increased clay on all fractures		
40	960	strong 0-20°, 90°		Minor hem. stain on fract. gray-orange clay in fractures. Andesite cont.		
41	964.5	mod. 0-70°		as above, bi-model andesite ≤ 1 mm plag. xls, in an aphanitic matrix, very uniform texture		
42	974	few 0-20° few 90°		clay infill on vert. fract., minor hem. coat on fract.		
43	984	mod. 10-30° few 80°		as above, 2-20 cm fracture spacing		
44	992.5	mod. 10-30° few 80°		clay on 80° fract.		
45	1000.5	strong 10-30° few 70°		minor breccia zone at 1,000', clay filled fracture spacing 1-3 cm		
46	1010.5	mod. 0-20°		as above		

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description		
47	1021	mod. 0-10° few 80-90°		clay filling vertial fract.-clay had drying cracks	Andesite (continued)	
48	1030	mod. 0-10° mod.70-80°		as above		
49	1039	strong 65° 0-10° few 90°		1038-39 breccia, clay filled		
50	1049	mod. 0-20° few 55°		as above, fracture spacing 5-20 cm		
51	1057.5	mod. 10-20° 60°, few 80°		clay on high angle fractures		
52	1057.5-1066.5	strong 70-80° few 10°, 60°		Andesite Flow continued from 846', dark-grn-gray, fine grained, 20% 1 mm xls plag. & pyrox fracture spacing 2-3 cm		
53	1075	Strong 80°		as above, fracture spacing 1 cm		
54	1082.5	Mod. 75-90° Few 30°		Andesite(?) poss. dacite continued.		
55	1091.5	Mod. 40-60° few 90°		clay on fractures		
56	1101	few 80-90°		clay on fractures		
57	1110	Few 80-90° few 60°		Conformable lower contact with underlying pyroclastic. 1109-1114 basal flow breccia		
58	1119	V. few 90° Minor slip 1115'	1114-1137.5	Lahar(?) volcaniclastic deposit, crude bedding. Carbon in top 1.5', mix. vol. clasts in tuff-sand-clay matrix	Lahar ave susc = 625.2 s dev = —	Log page 11
59	1130.5			Gray-brns to pale red near base -- base contact conformible, pebbles to 20 cm blocks, upper contact dips 15° lower contact 20°		
60	1139		1137.5-1243.5	Dacite (?) Porphyritic 10% 1-3 mm anhedral feld. plag? pyx, bio, matrix is grnish-black, aphanitic, even text, minor ves. upper 6'	Dacite ave susc = 1293.5 Sdev = 330.3	Log pages: 11-14 variation in susceptibility throughout
61	1149	Few 75-90°		porphyritic 10% 1-3 mm pheno. plag, prox bio. grn-black matrix, clay on fract. is pale-brn w/ red flakes, clay filled breccia 1143-1145		
62	1158	Few 50-60° & 80° & 30°		Clay coating on fract. ≤ 1 mm to 3 mm, tuffac. banded clay washed into fractures.		
63	1167	Few 90-80° & 60°		minor slip surface on clay joint 1160'		
64	1177	Few 90°		Dacite cont. joints clay coated		
65	1186	Mod. 70° 90° few 55°		pink clay in joints, washed in.		
66	1196	Mod. 50-60° few 80° & 40°		color grades to dark-olive gray. 40° flow-parting with clay & mica on fractures		
67	1205	Few 50° & 30° flow parting		few andesitic? xenoliths. 2 cm.		

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description Page 4		
68	1215	few 90-80° & 30°		dark brn coating-MnOx? on 30° fractures	Dacite continued	
69	1223.5	mod. 20° few 90°		dacite continued, 4-8 cm fracture spacing		
70	1232.5	few 20°, 70°		basal flow breccia starts at 1230', greenish-blk blocks with ash & minor clay filling breccia, vesicular, red oxidized matrix	Basal flow Breccia ave susc = 685.1 s. dev = —	Pg 14
71	1242			ves. in blocks increase, blocks red-oxidized also. minor pale-brn clay injected. Prob. flow emplacement fault at base.		
72	1251.5	fault 1243.5-1587 1244'		Volcano-clastic-2% porphy, pale-brn, Dacitic dome. lapilli to block size brn andesitic? clasts 2% xls.	volcano clastic/Breccia flow ave susc = 962.0 S dev = 500.6	The variations in this section seem to depend on amount of clasts present Pgs 14-16
73	1261	v. few 70°		pale red baked upper contact to 1251, pale brn clasts in a light brn to pink tuffac. clay matrix, clast suported		
74	1270.5			pink to brn laminated swelling clay infills between clasts.		
75	1280	few 70°		probable rubble flow or dome spree apron.		
76	1288	few 40°		volcano clastic or flow breccia continued, core breaks around clasts		
77	1297.5	few 70°		Dacitic (?) flow or dome with upper breccia 1243-1292'	Dacite/Andesite flow or dome ave susc = 738.6 s dev = 155.6	This appears to be almost a separate unit except for presense of lithics this unit of rock has consistent appearance & susceptibility & alteration minerals (1297'-1570') obvious flow planes -many fractured zones Pg 16-21
78	1306.5	few 70°		change to flow banded & sheared 70o to vertical.		
79	1315.5	mod 90°		vertical flow banded, probably a dome- or thick flow		
80	1325.5	mod 70°		dark grnish-gray, some flow brecciation continued,		
81	1335	mod 50-60°		clay along fractures		
82	1344	mod 70° few 30°		as above		
83	1352.5	mod 90° & 70° few 30°				
84	1362	mod 90° to 50° few 0-20°		Dacitic Dome or Flow continued from 1243'		
85	1370	prod 0-30° few 80°				
86	1379	mod 10-30° & 55-70°		2% 1 mm plag. pheno's., fracture spacing 3-7 cm		
87	1387.5	mod. 80-90°, 10°		as above, fracture spacing 1-5 cm		
88	1395	mod 80-90°, 10°		fracture density increased		
89	1404	mod 60-70° & 80°, few 20°		as above		
90	1412	strong 30-40° 80°, few		Dacite or poss. Andesite continued.		

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description	
					Dacite/Andesite contin.
91	1420	strong 80°, 10-20		Andesitic-Dacite Dome, continued 2% 1 mm pheno, in a dk grnish-gray matrix	
92	1428	strong 0-20° & 80°		pink clay wash-in along fractures, 1-5 cm spacing	
93	1438	mod 30° 60°, 80°		Viscosity as indicated by thick flow breccias suggest dacite	
94	1447	80-90° & 10-20°		flow shear appears to be about 10° dip	
95	1456	mod 90° few 5°		gray-pink clay up to cm thick in vert. fract.	
96	1466	mod 80° & 10°		dacite continued	
97	1475.5	few 80° 10, 60°		flow shear planes about 10° dip	
98	1485	strong 10o 80-90°		dacite continued	
99	1494.5	mod 50° 90°, 10°		2 cm thick clay wash-in on vertical fractures	
100	1503	mod 80° 60°, 10°		white mineral, plag? along flow shear planes	
101	1512	mod 80 & 10°, few 60°		dacite continued from 1243'	
102	1521.5	few 10°		fracts. along flow shears	
103	1530	mod 10° & 75°		dacite continued	
104	1539	mod 80° 10° & 30°		dacite continued	
105	1548	few 20° & 50°		dacite continued	
106	1557	few fract. 60°, 20°, & 90°		dacite continued	
107	1565	80-90° & 55°		fracturing moderate to strong frequency	
108	1574	few 30° & 70°	1570-1587'	basal flow breccia	Basal flow Breccia K=290-1500
109	1583	few 50° & 90°		basal flow breccia	
110	1592	few 40° 75-90°	1587-1629	Lahar? Volcanoclastic, lapilli & few blocks in an ash & clay matrix, non-sorted, dark-med gray	Lahar/volcanoclastic
111	1601	few 55°		2' beds of ash, 40 cm blocks. Andesite to basaltic clasts, also few pumice clasts	ave susc = 1526.6
112	1610.5	no fract		some clasts are fairly rounded-smoothed surfaces, few clast irregular to angular, no alteration	s dev = 287.3
113	1621	none		4 cm thick laminated bed at 1620.5	
114	1630	few zone		broke up with 80-90° fractures 1626-1629	

log Page 21

This flow breccia had wide variat. in susc. - probably to compos. of clithics

very large clasts of various lithol. relatively high K for entire unit (compared w/ basalts)

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description		
115	1639	few 50°	1629-1673.5	Basalt flow, viscular, to 1648, 2% 2 mm plag xl., upper flow breccia 1624-1644 in filled with ash & clay from lahar	Upper flow breccia w/interbedded basalt flow ave susc = 2550.4 s dev = 563.1	log pg 22 large clasts + ash matrix - high susc. core interbed basalt flow - low K,
116	1648	V. few 70°		brown and white clay layers half filling vesicles, basalt med-gray, fill surfaces 4° off normal to core	Basalt flow ave susc = 607.8 s dev = 288.10	log pgs 22-24
117	1656.5	few 50° 90°, 20°		brownish-gray, flow-shear planes dip 20°, with clay & ves. along planes		
118	1666	mod. 20° 90°-70°		clay in-filling along fractures. Basal flow breccia starts at 1666.5	Basal flow breccia K=967 to 1594 steady increase	log pg 24, 295
119	1675.5	minor faults 50-60°	1673.5-1694	Lahar or Volcanoclastic 10 cm clasts in banded clay and ash matrix, mostly clast supported	Volcanoclastic ave susc = 1167.9 s dev = 389.9	log pg 24
120	1684.5	mod 60-90° & 20°		clay slicken surfaces on fracture, probably minor movement. Most is gray brns & reds, mod-reddish-brn. matrix supported clay zone with gray lapilli		
121	1693.5	none		Vol. Breccia-Volcanoclastics continued. dk gray dacitic blocks with pale red-gray ash-lapilli matrix		
122	1704	few 55-60°	1694-1784	Basalt or Andesite-olive-black, fine grain. Pink clay-ash in-filling, non-porphyritic, plag, pyroxene-ol.?	Basalt ave susc = 768.9 s dev = 405.7	log pg 25-26
123	1711	mod. 60° 32°, 90°		top flow breccia to 1702' breaking along flow shear planes		
124	1721	mod. 70-90°, 20°		pale green clay coating or hem. on fractures		
125	1728.5	strong 80°, 45°		few 2 mm vesicles		
126	1737.7	mod 90°-70°		MnOx & clay on fract.		
127	1745.5	mod-strong 55°, 90o		strong MnOx coat on high angle fract. minor hem. stain on 55° fract.		
128	1755	mod. 50-60°		MnOx & blue-grn clay coat on 2-15 cm spaced fract.		
129	1764.5	strong 50-60°		rock type & alt. continued, fracture spacing 1-5 cm		
130	1779.5	mod 45-60°		fracture spacing 2-9 cm		
131	1788.5	few 70-90°	1784-1798	Intra-flow breccias and cinders, red, non-vesicular	Intra flow breccia + cinders cinders ave K = 309.2 sdev = 121.2 breccia ave K = 1045	log page 26
132	1798	few 60° 10°		clay matrix in-filling flow breccias		
133	1807.5	few 70-80°	1798-1820	Basalt Flow, med-dk gray, 25% 1-3 cm vesicles filled with blk-waxy clay, non-porphy	Basalt flow ave susc = 670.0 s dev = 146.8	log page 26
134	1817	mod 90-70°, 60° 10°		grn-blk clay & poss chlor on fract. minor flow breccia at base, but also slicken surface in clay alt. tuff		
135	1825	mod 70° 45 & 90°	1820-1826.5	Lapilli Tuff, clay alt. waxy, cracking clays, lapilli alt. also, mod. reddish brn. to orange. mod. sorting	Lapilli tuff ave = 673.2 s dev = 346.4	log pg 26
136	1834.5	few 70°	1826.5-1969	Basalt Flow, vesicular, black, non-porphy, upper flow breccia to 1836 in-filled with ol-brn ash	Upper flow breccia ave K 493.7	

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description		
137	1845	few 75°		vesicles & fractures filled with black-waxy clay	Basalt ave susc = 409.2 s dev = 192.0	P. 26-27
138	1854	few 90-70°		curving irregular fractures		
139	1863	none		Basalt Flow cont. color varies to dk. olive grn, basal flow breccia starts 1857'		
140	1872	none		flow breccia-gray to gray-red	Basal flow breccia ave k = 1090.6 s dev = 590	P. 27
141	1882	few 90-80°, 60° & 20°		as above, dark gray	Basalt ave susc = 527.8 s dev = ≈180	P. 27,28,29
142	1891	few 50°		flow shear planes at 50°		
143	1900	V. few 70°		flow shear 10-20°		
144	1909	few 70-80°		flow shear 20°, brnish blk clay on fractures		
145	1919	mod 70°-80°		basalt flow continued		
146	1928	mod 75° 30°, 90°				
147	1937	mod 65° 30°, 90°		basalt flow continued		
148	1946.5	strong 50-70°		rock crushed, abundant black-waxy clay on fract.		
149	1956	strong		dark gray basalt continued, strong fractures		
150	1964.6	V. few 50°		Basalt continued		
151	1974	few 80°, 70 & 30°	1969-1970.5	Lapilli tuff red, clay alt, compact, slicken surfaces	Lapilli tuff ave 389.0	
152	1984	few 55-70°	1970.5-2037	Basalt flow vesicular top w/flow breccia, dark gray, nonporphy, clay & chlor. alt. along fract.	basalt + interbedded breccias ave susc = 1240.1 s dev = 472	Log Pgs 29, 30, 31, 32
153	1992	mod 80-90°		few olivene pheno. 1-2 mm, partly alt., rock is grayish black		
154	2001	breccia fault		rock is strongly crushed & recemented by clay & chlorite, poss. zeo.		
155	2010	strong 60-70°		fractures of all angles, brecciated and cemented		
156	2019	brecciated		breccia		
157	2030			basal flow breccia, also crushed. red basal oxidized zone 2035-2037		
158	2039.5	few 65° & 80°	2037-2240	Basalt flows greenish-blk, vesicular, non-porphy strongly chloritized, ves. & fract. filled with white clay	Basalt ave susc = 652.7 s dev = 462	Log pgs 31 - 34
159	2049	mod 60° 45°, 80°		flow-breccia to 2039', poss. zeo. in vesicle, chloritized		
160	2057	few 45°		grnish, blk chloritized, white lined vesicles		
161	2067	few 50-75°		Basalt Flows cont. white xl. min. in ves. and fract., prob. zeo. cubic xls. and few euh. qtz xls.		
162	2076	few 20°, 65°		zeolite in vesicles and fractures		
163	2085	few 80° 90°, 55°		fract. healed with chlor & zeo.		

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description
164	2095	V. few 75°		vesicles continue thru entire flow
165	2105	V. few 65°		as above
166	2114	few 65°		as above
167	2124	few 90° 75°		as above-few zones alt. to red-brn
168	2133	few 65-80°		vesicle filling level 4° off normal to core axis, abundant 0.5 to 2 cm vesicles, zeo. lined
169	2142	few 40°		fewer vesicles
170	2151.5	few 65°		grnish-blk grading to dk red-brn
171	2161	few 90° 10° & 70°		dark red brn., dark yellowish-orange zeo, on 90° fract.
172	2170	few 90-85°		as above. about 1/2 grnish black
173	2179.5	few 60°		as above, grnish black
174	2189	few 65°		some breccia healed with chlorite. Intra-flow ash clay alt., compact at 2184'
175	2198	few 90°		fault zone?-crush breccia recemented by chlorite, clay slicken side & open space zeo. on vertical fract.
176	2208	none		totally chloritized, rock crushed and chlr. cemented, vesicles with zeo. & clay amygdules in some clasts
177	2218	few 65-50°, 40°		as above, grnish-black, zeolite and chlorite
178	2228	few 60°		chlr, zeo. alt., color grades to dk-red-brn
179	2231	few 30°, 60°		intra flow ash, brn-clay alt. compacted at 2240. Basalt grades back to grn. black
180	2247	few 65° 85°	2240-2318	Basaltic flow Breccia & Ash, vesicular upper flow breccia, zeo. amygdules, clay in-filling
181	2257	fault 40-60°		grn-black blocks, brn to olive-brn clay matrix, minor movement
182	2265	few 60-70°		red brn to gray flow breccia, chlor.-clay alt. some tectonic crushing
183	2273	few 70-80°		as above
184	2284	few 50-60°		basaltic? flow breccia cont.
185	2292.5	90-70°		extensive clay alt., chloritized, zeo. in fract.
186	2301.5	strong-50-90°		as above
187	2310.5	few 90° 50-60°		basaltic flow breccia and ash. cont.
188	2319	few 35°	2318-2419	Lahar(?) w/minor ash & vol. breccia zones. Grnish-blk. to red. ol. brn. chlor, clay alteration
189	2327.5	few 40°		mixed vol. litho. in clasts
190	2337.5	few 10° 45°		increased gray-red ash
191	2348	few 50° & 20°		dk gray brn to red Lahar/vol. breccia
192	2358	irregular		mixed vol. clasts types, andesitic, hornblendes,

Basalt continued

intra flow ash ave=351.4 — 2225'-2229' P. 34

Basaltic flow breccia

ave susc = 838.6
s dev = 481.0

there were interbedded intervals of basalt (usually these had lower susc.) the susc. seemed to be directly prop to the size & amt of clasts. The higher the susc, the less matrix in sample

Log pgs 34, 35

Lahar with interbedded ash + volcanic breccia

Lahar
ave susc = 1155.9
s dev = 355.3

ash flow
2331 – 2341
ave susc = 562.6
s dev = —

the less mafics & lighter matrix had lower susc

ash flows have much lower susc than rest

log pg 35, 36, 37

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description
193	2366	few 20-30°		chlorite and clay alt. continued
194	2374.5	strong 90°, 20-30°		core broke up - Lahar cont.
195	2383.5	mod 80°, 30°		poss. lithic rich pyroclastic flows, slip on fractures
196	2393	mod 20-30, 70-90°		as above
197	2402.5	few 90° 45°, 70°		chloritized as above. poss. lava flow or dike 2400-2412
198	2411	strong		as above, fractures of all angles
199	2420	few 50°		grn-black to red, Vol. breccia-Lahar
200	2430	mod 20° 30-50°	2419-2448	Andesitic Breccia, dk-grn-gray to gray-red. Uncertain as to brecciation pre-dates emplacement or post dates chloritization. strong chlr.
201	2440	strong 50-75°		clast-matrix ratio variable
202	2449	strong 50° few 80°		minor movement on these fract. surfaces
203	2458	mod-strong 68-70°, 25-45°	2448-2454	Crystal Ash Flow Tuff, clay alt. 15% 1-2 mm plag. xls., compact, abund. bio., brn
204	2467.5	few 70° & 75°	2454-2546	Andesite Flow, 15% 1-2 mm plag. xls. alt to chlor, clay, minor calcite. flow is brecciated
205	2466.5	few 70°, 50°		brec. mostly flow emplacement, gray-red-brn to grn-black
206	2486	V. few irreg.		flow grades to dk grnish-gray, w/hornb./bio 1-3 mm and motled appearance, magnetite still present
207	2495	few 80° 20°		strong chloritization, fractures zeolite filled
208	2504	few 70-80°		chor. veinlets along crush surfaces, zeolite
209	2512.4	few 25°, 90°		rock is more crushed, extensive tectonic breccia and chlr. matrix
210	2512.5	few 80°		as above
211	2533	strong 75-80°		Andesite flow continued dark grn-gray, 15% porphy- strong, chloritized, clay? grn schist?
212	2543	V. few		basal flow breccia with red matrix ash 2535-2546
213	2552.5	V. few 50°	2546-2586	Andesite? flow, 15% 1-2 mm pyx xls. pyx. are little alt hem. coating, dark gray
214	2561.5	V. few 20-50°		Upper flow top breccia 2546-2553, poss. port. alt. pyx to hornb.
215	2570	mod. 80°		minor zeo. along 80° fract. Much less chlor. alt.
216	2579	strong 70-90° few 20°		pale grn. clay along fractures

Lahar (cont)

ASH FLOW ave = 181.8
2417 - 2419

Andesite Breccia

ave susc = 1012.0
S dev = 522.3

P. 37

Crystal ash flow tuff
ave = 251.8

P. 38

Andesite Breccia flow with red ash matrix
ave = 781.3 sdev 267.8

P. 38

2469 Andesite Breccia flow w/ gray matrix ave = 1585.2 sdev = 254.1 P. 38

2478 Andesite flow ave = 815.7

2486 P. 38

Andesite flow Breccia light gray matrix

ave susc = 884.4
sdev = 296.7

Pgs 38 – 40

2535 Basal flow breccia ave susc = 514.4 P. 46

2546 Upper flow Breccia ave susc = 1698 P. 40

2553 Andesite
ave susc = 3685.9
sdev = 816.5

P. 40-41

2581 Basal flow breccia
ave = 539.7

P. 41

2586

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description
217	2589	few 45° 75-80°	2586-2602.5	Lithic-lapilli tuff red to pale grnish-gray, 60% lapilli sand to 3 cm size mixed vol. litho
218	2598	few 45° & 65°		few V. pale grn. fiamme, compacted strong chloritization of matrix, mod. clay alt.
219	2606	none		Lapilli reduced to 30%, more fiamme.
			2602.5-2657	Crystal Lithic Tuff. grayish-blk, 10% 2 mm plag. 2603
220	2615	1 fract 25%		≤ cm lapilli 5% mix vol. litho, black-fiamme, 2605
221	2624.5	V. few 40°		vol. brecc. at top of unit 2602-2604.5 tuff appears little altered
222	2633.75	none		Vitric ash 2616
223	2643	none		compact, pumice flattened, but not strongly welded obsidian lapilli, matrix unaltered
224	2652.5	none		minor clay & chlorite alt. near base 2656'- tuff lightens to brnish-gray below 2654
225	2662	none	2657-2694	Olivine Basalt, ves. near top 10% 1-2 mm 2657 olivine 3% plag, amygdules of zeo? 12' flow breccia on top
226	2671	few irreg.		black to brnish-gray, minor chlor. alt, zeo. 2668 filled fract.
227	2680	few 50°		
228	2690			> cm size open space lift in breccia, zeo. cement & coat. basal flow breccia starts 2684', soft, 2678 white zeo.
229	2699	none	2694-2713	Lahar, mixed vol. lapilli to blocks in a clay + 2694 sand matrix, dk red-brn to olive black
230	2708.5	few irreg.		mixed colors & non-to porphy. clasts
231	2717.5	few 45° w/sliken	2713-2719	Lapilli ash 1-3 mm clasts, well sort. yel-brn to 2713 dk yel.-brn, 3 cm clast near base
232	2727	none	2719-2726	Lahar or volcanoclastic, light gray blocks- 2719 lapilli in an olive-black matrix, clasts are rounded, non-sort
233	2736.5	none	2726-2842	Andesite Flow, 5% 2 mm pyrox, 2% plag. 2726
234	2745	few 80°		blk-red-pale brn-to gray black, hem clay alt. 2733
235	2754.5	few 80°		zeo. on fract. minor alt.
236	2765.5	mod. 70-90°		pale grn clay or celadonite on fract. 2740 black MnOx(?) coat and waxy clay on fract. chlor. alt. increases
237	2775	mod. 70-90°, few 30°		clay & chlor. on fractures, andesite or poss. basalt cont.
238	2784.5	mod 70-90°, few 30°		minor movement on high angle joints, chlor-+ zeo. cement fractures
239	2794	mod 70-30o, few 90°		crush and chlor. alt.

Lithic lapilli tuff
ave susc = 901
s dev = 373
Pg 41

volcanic Breccia ave = 1276

crystal lithic tuff
ave = 1566.4
s dev = 23.6
P. 41

crystal lithic vitric tuff
ave = 1276.0
s dev = 249.8
P. 41-42

upper flow breccia - Andesite
ave = 2083.4 s dev = 503
P. 42

Andesite/Olivine Basalt(?)
ave = 1888.9
sdev =
P. 42

Basal flow breccia - Andesite
ave = 1961.6 s dev = 417.9
P. 42-43

Lahar
ave = 1060.8
P. 43

Lapilli ash
ave = 1439.4 s dev = 65.1
P. 43

Lahar/volcaniclastic
ave = 1131.4
P. 43

upper flow breccia
ave = 991.2
P. 43

andesite red matrix
ave = 259.6
P. 43-44

Basatic Andesite/Andesite (with breccia zones)
ave susc = 1471.8
sdev = ——
P. 44-46

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description		
					Basaltic Andesite / Andesite cont	
240	2804	mod. 70-80°		clay on joints as above		
241	2814	mod. 70-90°, 40°		Andesite Flow-cont. grnish-black, 5% 2 mm prox., 2% plag. strong chlor. alt.		
242	2823	mod. 80-90°, 50-60°		chlor. on fract.		
243	2832	mod. 60° few 45°		Andesite flow continued		
				2837		
244	2842	few 60-75°		color changes to gray-red in basal flow breccia at 2837	Basal flow breccia	P. 46
				2842		
245	2851.6	few-mod. 80-90°	2842-2935	Volcano-clastic or Lahar Mixed litho. of lapilli to blocks, non-sort., fine matrix of ash to clay, red-olive blk	Volcaniclastic - Lahar or Volcanic Breccia	much variabil. due to amt & type of clasts, and mafics in matrix (P. 46-48) matrix changes throughout unit (ash/clay/mud) with transitional/indistinct contacts minor grading of lapilli/blocks
246	2861	irreg. breaks		zeolite filling fractures	ave susc = 1086.3	
247	2870	few 70°		brown clay alt. matrix, minor stricken surfaces		
248	2880	few 10°	2877-2879	Well sorted lapilli zone-dk brn to yel-brn clay alt. ash-cinders?, 75° slip surfaces		
249	2889	60°-45°	2885-2891	Lapilli-clay alt, compact, few slip surfaces		
250	2899	75°, 90° & 45°		as above, yel-brn & pale grn.		
251	2909	few 75°		Lapilli cinders, minor ash, few blocks		
252	2918	few 80°		grn, dk-gray & dk red lapilli few light gray, grnish gray to brn.		
253	2928	few 80°		olive black		
				2935		
254	2937	few 45° 70 & 90°	2935-2952	Ash or tuff, trace plag. xls., dk. gray to gray-red	ash and/or tuff ave susc = 784.3	P. 48
255	2945	few 75°		rare lapilli in ash, few slip surfaces		
				2952		
256	2955	few 65-90°	2952-2966	Volcanoclastic lapilli pyroclastic, mix litho, dark grnish gray, slip surfaces on clay	volcaniclastic / volcanic Breccia ave = 1075.9 sdev = 319.1	P. 48
257	2964	strong 90-60°		few blocks & thin sand bed. clay alt. matrix. Basal contact is a fault		
				2966		
258	2973.5	mod. 45° 80-90°	2966-4800 TD	Olivine Basalt flows. fine grain few mm xls. olivine, grnish blk to blk. mod. chlor-alt., 2% mm plag. xls.	Olivine Basalt flows with interbedded olivine breccias	
259	2983	mod. 65°		upper contact is a minor fault at 2966'		
260	2992	minor-irreg.		flow breccia, small irreg. vesicles, minor zeo.		
261	3001	few 65°		multi-colored flow breccia, mono-litho, zeo. and clay alt.	ave = 1066.6	
262	3010	few 45°		vesicular, 1-3 mm, irreg.		
263	3018.6	irreg.		as above		
264	3028	none		dunite zenoliths?		
265	3037.5	few 80°		Basalt Flows continued, light blue clay alt.		
266	3047.5	few 60°		as above		
267	2057	few 90°		as above, flow breccia-cinders		
268	3066.5	strong 90°, 70°, 50°		more solid flow rock, white, blue & grn coating on fract.		

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description
269	3076	few 80°		flow breccia, vesicular
270	3085	few 50°		vesicular, vesicles open, coated w/blue clay
271	3084	none		continued dk gray-brnish gray, vesicular, irregular vesicles, 2% plag.
272	3103	none		as above, clay coating vesicles
273	3113	few 60-90°		med gray - as above
274	3123	strong 50-90°		open fractures, clay and chlorite, malachite
275	3131	mod 60		as above
276	3140.5	few 60-70°		open irreg. ves. flow breccia-cinders
277	3150	mod. 70-90°		chalcedony coating on open fract.-space
278	3159.5	mod. 90-70°		
279	3168.5	mod. 60-70°		as above, open irreg. ves.
280	3177.5	few 10° & 70°		as above
281	3187	few 70-80°, 100		chlor. on fract.
282	3196	few 80°, 40°		some open breccia at 3196'
283	3205.5	few 45° 65°		as above
284	3214.5	few 50-40°		clay in filling breccia & fract. chlor-alt.
285	3223.5	few irreg.		vesicular, as above
286	3233	few 30°		as above
287	3242	irreg. breaks		vesicular
288	3252	few 80° 30°		Basalt Flows continued from 2966'
289	3261	few 90° & 60-70°		as above
290	3270	few 90-80° & 60°		as above
291	3279.5	few 70°		as above
292	3289	few 60°		
293	3299	few 90°		flow centers & breccia, mod. chlor. alt. in flow breccia
294	3308	few 25° & 90°		
295	3318	V. few 65°		as above, clay and zeolite along fract. cont.
296	3328	85° few		vesicular flow breccia, minor chalcedony

Olivine Basalt + flow breccias cont

Basaltic andesite with Breccia flows

ave = 1572

3292' - 4800'

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description
				Page 13
297	3337	few 80°, 60°		as above
298	3346	mod-strong 90°, 10°, 60°		as above, flow center
299	3355	mod. 80-90°, 55°, few 10°		
300	3364	few irreg.		as above, flow breccia
301	3373.5	55° few		Basalt-Andesite Flows continued, dark red-gray to grnish black, 3% 1-2 mm plag. xls.
302	3383	mod. 90° 60-75°, 10°		chlor. on fract. about 2/3 flow breccias & 1/3 solid flow center, Flow brec. consolidated. 2 mm irreg. vesicles
303	3392	mod. 80-90°, few 20-30°		chlor. on fractures
304	3401	mod. 70-90°, few 30°	3396-3421	flow breccia vesicular, dk olive grn
305	3411	none		fract. joints not present in flow breccia flow breccia cont.
306	3421	none		vesicular flow breccia, grn-gray shades
307	3430	mod. fract. 55°, 90° 20°	3421-3434'	flow center, open space 2nd minerals chlor-white zeo., poss. clay blue-grn Basalt Flows continued from 2966'
308	3440	mod. 80° 10-20°		flow breccia starts 3434, vesicular
309	3439.5	few 80° 20°, 45°		flow breccia to 3444 then flow center
310	3458.5	few 90-80°, 45° 10°		flow-breccia 3 feet thick
311	3468	one 90° 2-20°		all flow breccia
312	3477	irreg.		dk-gray-grn to grnish black. Vesicular flow breccia, consolidated
313	3487	mod. 70-75°, 30°		grn. chelcedony? on fractures, flow center
314	3497	few 75-90°		flow breccia, empty vesicles
315	3507	few 80°		as above
316	3517	irreg. 50°		as above
317	3526	mod. 75-80°, few 45°		flow center

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description
				Page 14
318	3535	mod. 80, 70°, few 10°		flow center to 3531 then flow breccia chlor. on fract.
319	3544.5	strong 60-70°		flow breccia zeo. along fract. & coat open space breccia
320	3553.5	mod. 70° irreg.		flow breccia, vesicular
321	3563	few 30°		vesicular flow breccia, as above
322	3572.5	2-55°		as above
323	3582	few 65-90°		clear to pale grn. zeolite on fractures
324	3592	V. few 57°		flow breccia-open vesicles
325	3601.5	V. few 70°		as above
326	3611.5	mod. 35°, 45°, 90°		Basalt Flows continued from 2966'. 5' thick flow center vesicular
327	3620	few 45° 75°		4' flow center - 6` flow breccias
328	3629	V. few 10-20° & 50°		calcite coating on one fracture didn't effervese !
329	3638.5	V. few fract. 55° & 20°		matrix of flow breccia strong alt. to chlor or celadonite?
330	3648.5	V. few 80°		as above
331	3658	irreg. breaks		Basalt-Andesite? Flows continued, dk-gray, brn, gray-grn. 3% 1-2 mm plag. vesicular 2 mm, vesicles -1/2 filled w/zeo.
332	3669.5	irreg. break		flow breccia as above
333	3677	none		zeo. & clay as above
334	3687			as above
335	3696			as above
336	3706	none		at 3703, 3 cm vesicle-zeo. coat, amygdules of chalcedony, celadonite
337	3715	none		qtz & celadonite amygdules
338	3723.5	few 8° & 50°		as above
339	3733	mod. 75°, 40°		flow breccia
340	3242.5	V. few 60°		as above
341	3751.5	irreg.		as above
342	3760.5	few 90, 70°		as above
343	3770	few 70° 80°		ves. 2/3 filled. as amygdules

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description
				Page 15
344	3779	few 90-60 irreg.		flow breccia as above
345	3788	irreg.		as above
346	3797	few 90-80, 65°		as above
347	3805.5	mod. 80°, 60, 30°		Basalt Flows continued from 2966' qtz. filled 7' flow center amygdules
348	3815	none		flow breccia-as above
349	3824	few mod. 45°, 90°		as above
350	3833	few 75-80°		as above
351	3842	few 65°		as above flow breccia, qtz amygdules
352	3852	few 65o		vesicular, few celadonite filled, some open
353	3861	strong 75-80°, few 30°, 60°		chlor & qtz along fract.
354	3871	few 80-90°		as above, flow breccia
355	3880	few 80-90°		most vesicles empty
356	3889	none		flow breccia
357	3998	few 65° 80°, 90°		as above
358	3907	mod. 65-75°		celadonite amygdules but most ves. empty, flow breccia as above & qtz amygdules
359	3916	none		as above, breccia
360	3924.5	mod. 80-90°, few 75°		flow center. 8' thick
361	3434	none		Basalt-Andesite flows cont. 2 mm vesicular, 5-10% 3% 1-2 mm plag. xls, grnish-blk, to dk gray
362	3943.5	none		flow breccia cont.
363	3953	few irreg. 75°		as above
364	3962	few 20-25°		as above
365	3972.5	few 90° & 70°-80°		fract. qtz rock more crushed below 3970', qtz cemented
366	3982	strong 50-90°		chlorite & qtz cement
367	3991.5	few 20-30°		Basalt Flows continued from 2966', qtz amgydules
368	4000	mod. 90° 55-65°		as above
369	4009.5	few 70°		as above

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description
				Page 16
370	4019	mod. 80-90°		fract. in flow center, qtz in celadonite-chlor on fract.
371	4028	strong 70-90° 50°		qtz. vein/fract. fill increasing flow center
372	4037	few 70°		flow breccia, less qtz
373	4047	few 75°		as above, less qtz
374	4055.5	strong 70-80° 55°		flow center
375	4065	strong 70-80° few 55°		flow center as above
376	4074.5	mod. 80° & 20°		as above, center to breccia at 4069'
377	4084	strong 90°, few 65°		as above, flow center ~~4089-4103~~ 8
378	4094	strong 80° & 70°		flow breccia to 4099
379	4102	strong 90°, 70-80°		as above, flow center 4089-4103
380	4112	few 60° & 80°		as above, flow breccia
381	4121	none		as above
382	4030.5	few 50°		as above
383	4140	none		celadonite amygdules
384	4149.5	none		as above
385	4158.5			as above, flow breccia
386	4168			flow breccia
387	4177.5			as above
388	4186	mod. fract. 70-80° & 50°		as above, Basalt Flows
389	4195	few 40°		chlor. on fract., qtz. amygdules
390	4206	mod. 85-90°, few 45°		as above
391	4216	few 25 & 70°		Basalt flows & breccia-cont. from 2966' 2 mm vesicular-5 10%, 3% plag. 1-2 mm, grnish-black
392	4226	strong 90°, 50° 75°		vesicles to 1 cm
393	4235	mod. 90° 35-30°		as above
394	4245	trace py.		qtz. & celadonite amygdules, zeo.

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description
				Page 17
395	4255	no fract.		as above, breccia
396	4284.5	strong 75-80° 25°		flow center
397	4274	mod. 80-90°, few 20°		flow breccia
398	4283.5	few 65-70°, 30°		most ves. open/unfilled
399	4293	mod. 90° few 85°		as above
400	4301.5	few 85-90°, few < 10°		as above
401	4311	few 60° 45°		as above-flow center, upper part vesiclar
402	4321	few 50, 90°		as above, center-breccia-ves. top
403	4330	few 90° 40°		as above
404	4339.5	strong 90°-80° 10°		Basalt Flows and intra Flow Breccias continued from 2699'
405	4349	few 90°		flow breccia
406	4359	few 80° 50°		as above
407	4368	none		as above
408	4377	few 70-90°, 25°		thin qtz coat on fract.
409	4387.5	mod. 90° 50°		flow center, as above
410	4397	few 55° & 25°		as above, flow center to 4391 breccia
411	4406.5	mod. 40° 80°		as above, flow center
412	4415	mod.		crushed rock with fractures at all angles
413	4423.5	strong 30° & 60°		as above
414	4433	mod. 30° & 60°		minor fault 30°, flow center over breccia
415	4442	irreg.		as above, ves. breccia
416	4451.5	few 55°		basalt cont.
417	4461	V. few 60°		qtz. amygdules
418	4471	few irreg.		as above

Box #	Bottom Depth Of Box	Fractures (90°=vert.)	Unit Interval (feet)	Lithology Description
419	4480.5	few 90°		as above
420	4489.5	mod. 10°, 30o, 80°		flow center

Box 421 to 453, Interval 4536-4800 T.D. Basalt Flows and breccia continued from 2966'

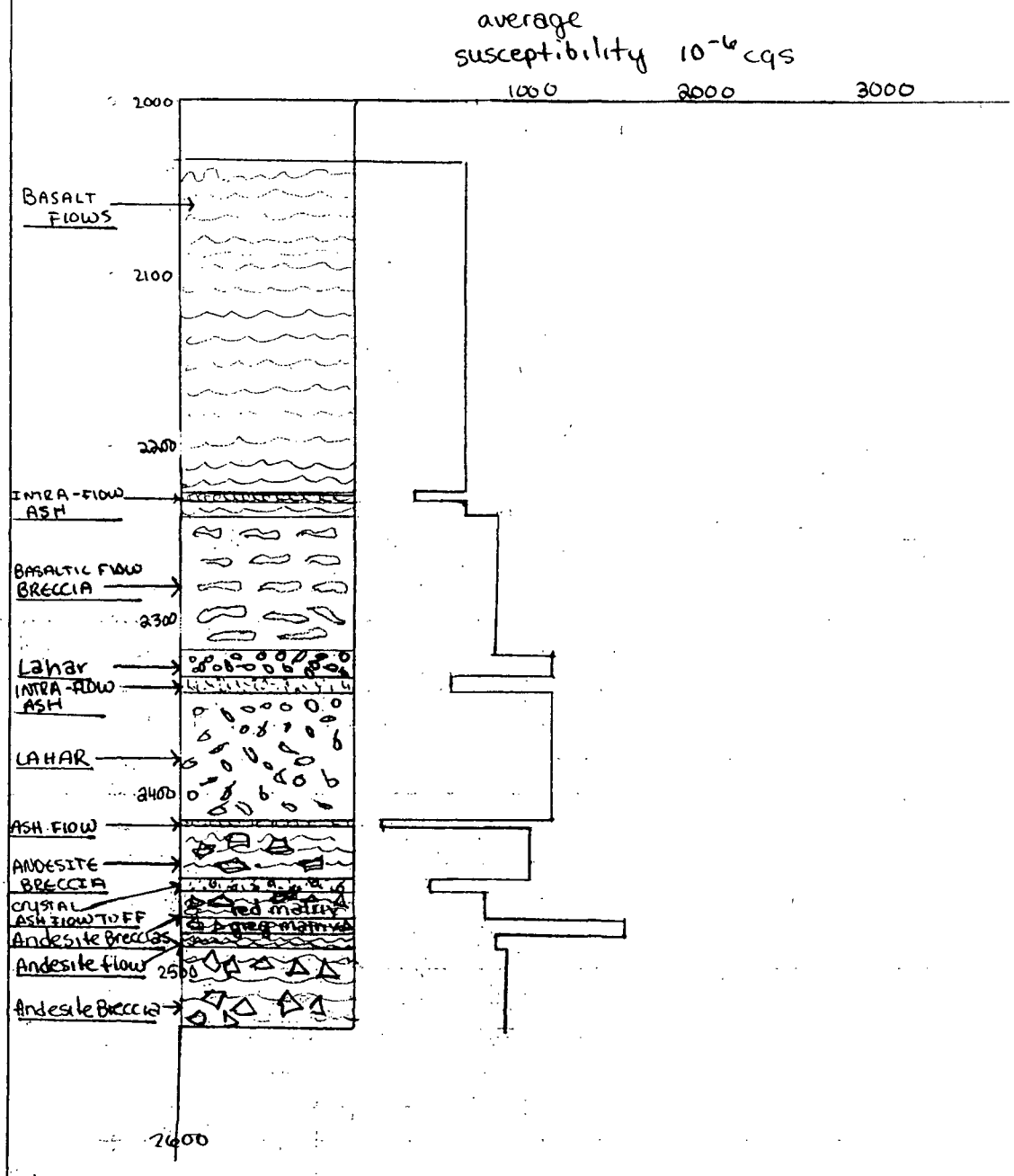
misc. notes on susceptibility.

The variations in susceptibility measurements within a lithologic unit appeared to be dependent on the following: clast amount and composition (for flow breccias.), vesicularity (for lava flows + breccias with basaltic clasts), and matrix composition. A clast supported unit had a significantly higher susc. measurement than a matrix supported unit. In addition, if the clast were of a mafic composition, the susc. was higher as compared to clasts with a more intermediate makeup. The vesicularity played a dramatic role in causing variations within a lithologic unit, especially the 2000 feet of Olivine basalt and basaltic andesite at bottom of hole. Thus particular sequence would have very dense and very vesicular flows interbedded within one foot of each other. Another variation is the matrix "color", which seems to be directly proportional to susceptibility magnitude. It appeared that the lighter the matrix, (the more red/orange ash clay) the lower the susceptibility, for example, the sequence of andesite breccias at depths 2454' - 2478' has 2 distinct matrixes: a unit with a red orange matrix having a susceptibility ave. of $781 \cdot 10^{-6}$ cgs followed by a unit with a grey matrix that has an ave. susc. of $1585.2 \cdot 10^{-6}$ cgs. Nevertheless, it was obvious that these breccias belonged to the same lithologic unit.

There didn't appear to be any correlation between alteration minerals (and extent of alteration) and susceptibility.

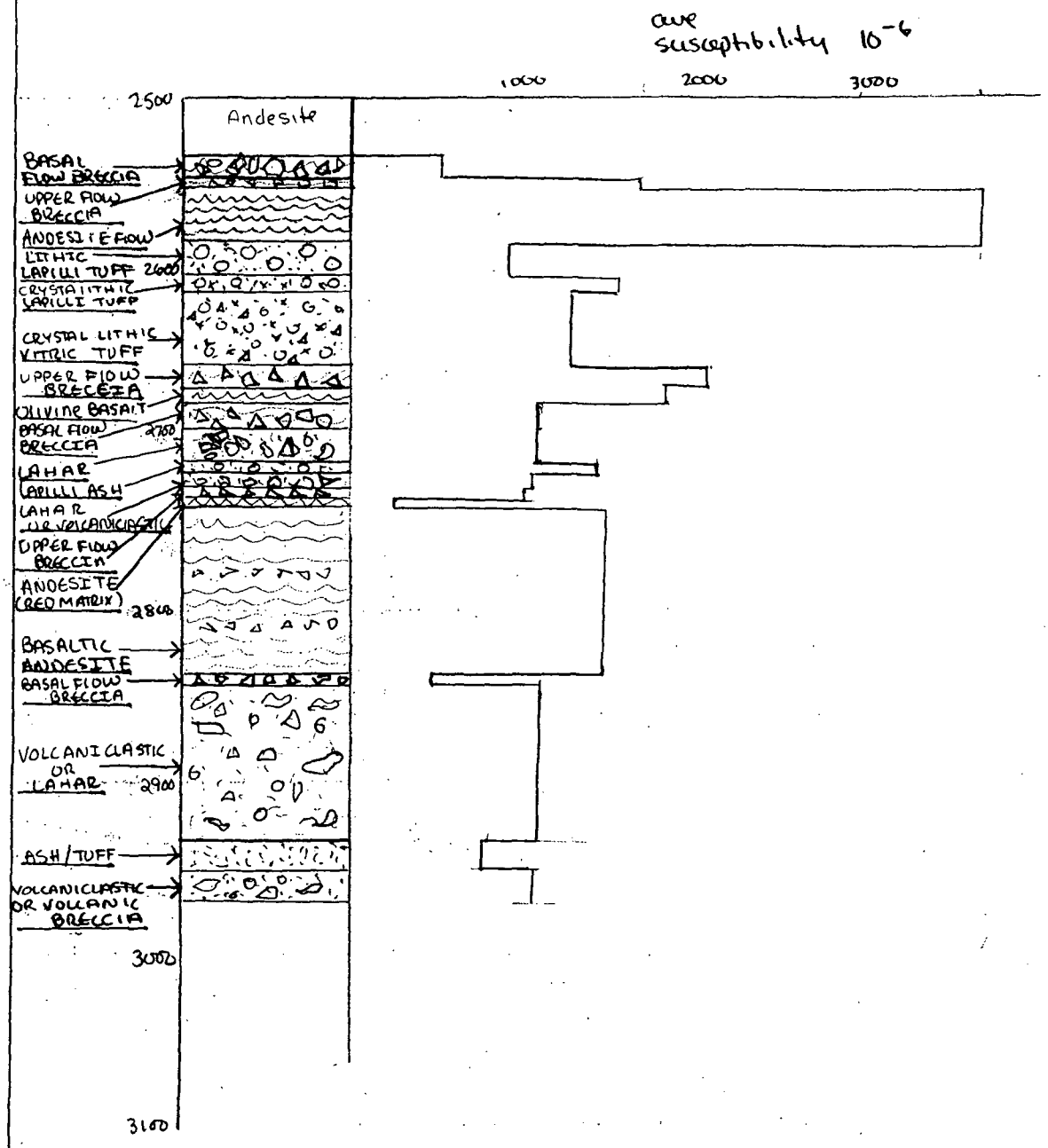
CTGH-1

average susceptibility
2037' - 8535'



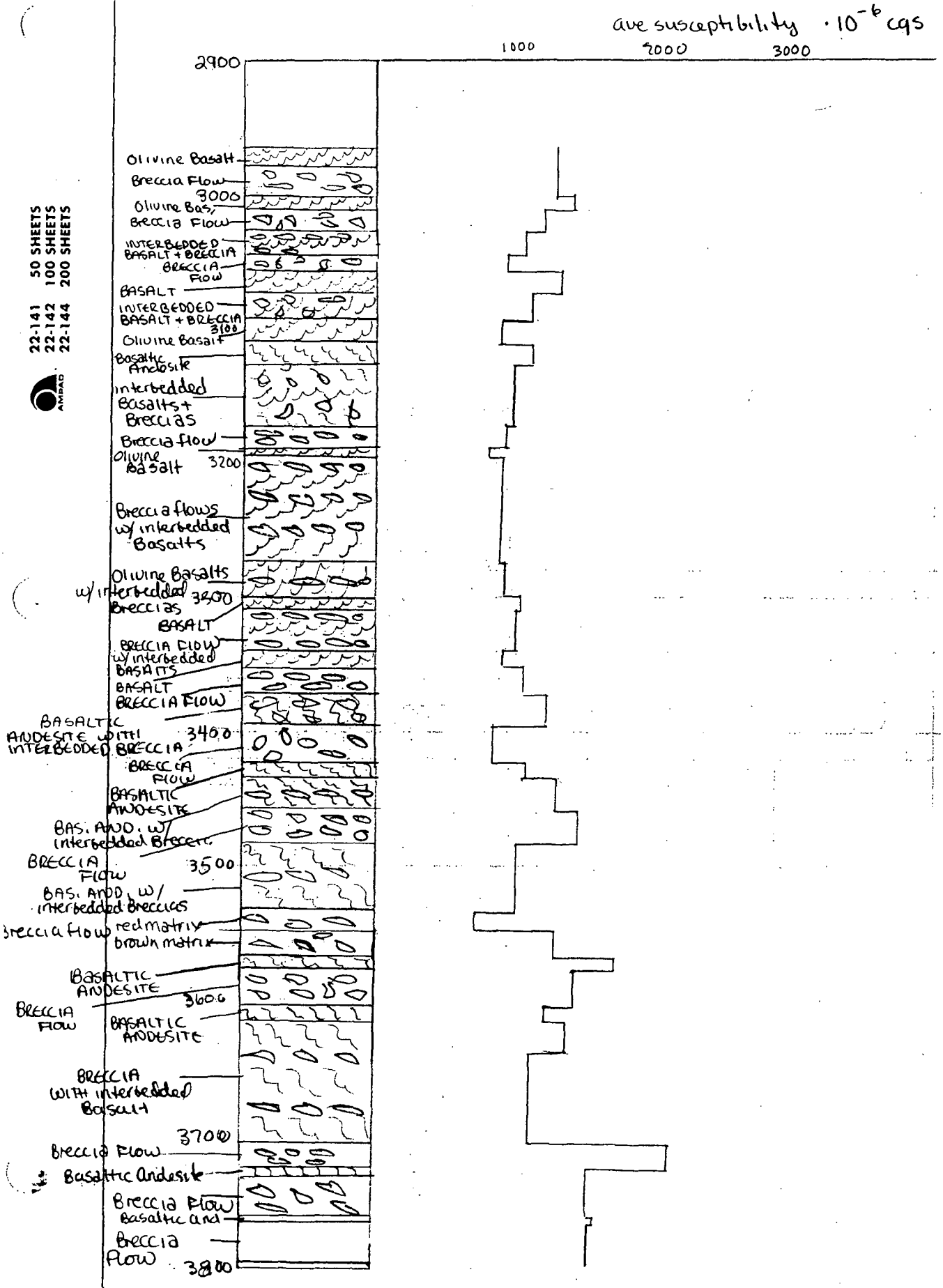
CTG 14-1

ave. susceptibility
2535' - 2966'

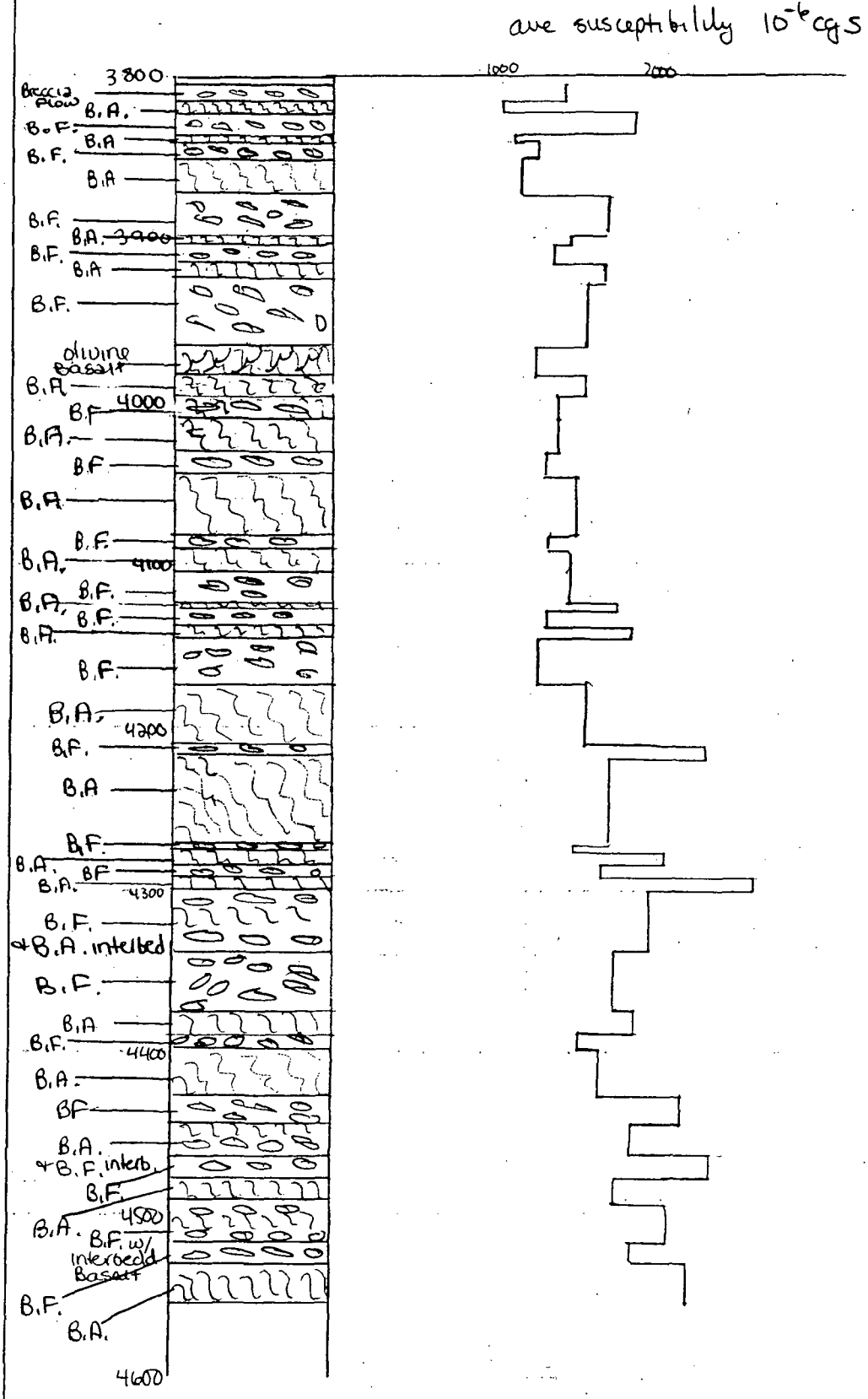


CTGH-1

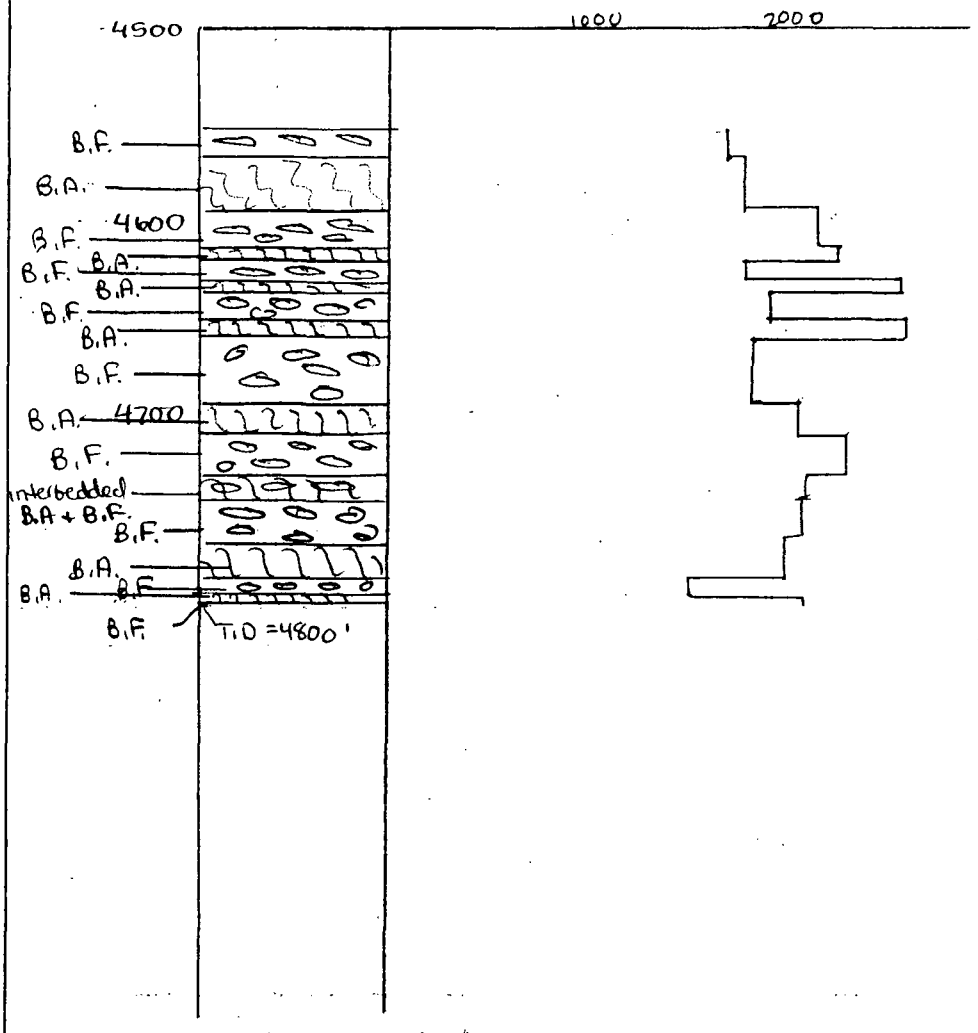
ave. susceptibility
2966' - 4800' TD



B.F. = Breccia Flow
B.A. = Basaltic Andesite



ave susceptibility 10^{-6} cgs



Lithology	Depth interval	ave susceptibility 10^{-6} cgs
Basalt flows	2037' - 2240'	652.7
intra-flow ash	2225' - 2229'	351.4
Basaltic flow breccia	2240' - 2318'	838.6
Lahar	2318' - 2341.7	1155.9
INTRA FLOW ASH	2331 - 2341	562.6
ASH FLOW	2417 - 2419	181.8
Andesite Breccia	2419 - 2448	1012
crystal-ash flow tuff	2448 - 2454	251.8
Andesite Breccia with red ash matrix	2454 - 2469	781.5
Andesite Breccia with grey matrix	2469' - 2478'	1585.2
Andesite flow	2478' - 2486'	815.7
Andesite Breccia flow	2486' - 2535'	884.4

Lithology	Depth interval	ave suscept. 10^{-6} cgs
basal flow Breccia	2535 - 2546'	514.4
upper flow Breccia	2546' - 2553'	1698
Andesite flow	2553' - 2586'	3685.9
Lithic Lapilli Tuff	2586' - 2603'	901
Crystal lithic lapilli tuff	2603 - 2616	1566.11
crystal lithic vitric tuff	2616 - 2657	1276
UPPER FLOW BRECCIA	2657' - 2668'	2083.4
Andesite(?) Olivine Basalt	2668' - 2678'	1888.9
Basal Flow Breccia	2678' - 2694'	1061.6
Lahar	2694' - 2713'	1061
Lapilli ash	2713' - 2719'	1439.4
Lahar / volcaniclast.	2719' - 2726'	1061
upper flow breccia	2726' - 2733'	991.2
Andesite (red matrix)	2733 - 2740	259.6
Basaltic Andesite	2740' - 2837'	1471.8
Basal Flow breccia	2837' - 2842'	511.3
volcaniclastic	2842' - 2935'	1086.3
ash/tuff	2935' - 2952'	784.3
volcaniclastic - volcanic	2952' - 2966'	1075.9

	Data	ave susceptibility 2966' - 4800' TD

Lithology	Depth Interval	ave suscept.	
- Olivine Basalt	2966 - 2979	1370	
- Breccia flow	2979 - 3001'	1399	
- Olivine Basalt	3001' - 3013'	1460.8	
- Breccia flow	3013' - 3028'	1246.3	
- Interbedded Olivine basalts & breccia flows	3028' - 3044'	1110.2	
- Breccia flow	3044' - 3058'	989.4	
- Basalt	3058' - 3067	1374.8	
- Interbedded Breccia & Olivine basalts	3067 - 3093	1159.8	
- Olivine Basalt	3093 - 3109	962.5	
- Basaltic Andesite	3109 - 3127	1166.4	
- Interbedded Basalts & Breccias	3127 - 3175	1005.3	Olivine Basalts & Olivine Breccia Flows
- Breccia flow	3175 - 3191	945.5	
- Olivine basalt	3191 - 3197	848.8	ave = 1066.6
- Breccia flow w/ interbedded Basalts	3197' - 3274'	938.3	2966' - 3292'
- Olivine Basalts w/ interbedded Breccias	3274' - 3300'	968.6	
- Basalt	3300 - 3308'	1084.5	Basaltic Andesite + Breccia flows
- Breccia flow with interbedded basalt	3308' - 3340'	1014	
- Basalt	3340' - 3352'	962.1	ave = 1572.5
- Breccia flow	3352' - 3372	1084.6	s dev = 518
- Basaltic Andesite w/ interbedded Breccias	3372' - 3396'	1242	3292 - 4800TD
- Breccia Flow	3396' - 3421	873.8	
- Basaltic Andesite	3421' - 3434'	1036.1	
- Bas. Andes. w/ interb. Breccias	3434' - 3459'	1318.3	
- Breccia Flow	3459' - 3481'	1502.7	
- Basaltic And. w/ intebedded breccias	3481' - 3531'	1079.5	
- Breccia flows red brown	3531' - 3546'	765.9	
	3546' - 3571'	1344.8	
- Basaltic And.	3571' - 3575'	1803.5	
- Breccia Flow	3575 - 3601'	1460.4	
- Basaltic And.	3601' - 3616	1286	
- Breccia flows w/ interbedded basalt	3616 - 3706	1401.2	
Breccia flow	3706' - 3723'	1166	
Basaltic Andes	3723' - 3727	2200.1	
Breccia flow	3727 - 3760	1611.9	

Basaltic Andes	3760 - 3764	1661.3
Breccia flow	3764 - 3797	1611.9
Basaltic Andes	3797 - 3804	1380.4
Breccia Flow	3804 - 3815	1425.5
Basaltic Andes	3815 - 3821	1141.6
flow breccia	3821 - 3835	1851.0
basaltic Andesite	3835 - 3840	1159.7
flow breccia	3840 - 3852	1239.1
Basaltic Andesite	3852 - 3874	1188.5
Breccia flow	3874 - 3897	1692.1
Basaltic Andes.	3897 - 3902	1450.1
Breccia flow	3902 - 3915	1345.9
Basaltic Andesite	3915 - 3922	1623.7
Breccia flow	3922 3965	1523.6
Olivine Basalt	3965 - 3982	1250.2
Basaltic Andes	3982 - 3999	1556.8
Breccia Flow	3999 - 4010	1380.7
Basaltic Andes.	4010 - 4029	1394.8
Breccia flow	4029 - 4044	1296.8
Basaltic Andes.	4044 - 4081	1494.0
Breccia Flow	4081 - 4089	1328.9
Basaltic Andes,	4089 - 4105	1469.5
Breccia flow	4105 - 4122	1465.2
Bas. and	4122 - 4125	1742.1
Breccia flow	4125 - 4139	1289.2
B.A.	4139 - 4144	1821
Breccia flow	4144 - 4175	1256.1
Bas. And	4175 - 4210	1572.9
Breccia flow	4210 - 4217	2313.4
Bas. And.	4217 - 4267	1703.6
Breccia flow	4267 - 4271	1491
Bas. And	4271 - 4282	2043.4
Breccia flow	4282 - 4287	1626.1
Bas. And.	4287 - 4298	2606.6
interbedded	4298 - 4338	1929.6
Breccias + Basaltic Andes.		
Breccia flow	4338 - 4376	1771.6
Bas. Andes.	4376 4390	1837.8
Brecia flow	4390 - 4399	1505.9
Bas. And.	4399 - 4426	1646.4
Breccia flow	4426 - 4442	2146.7
basalt + breccia flows (interbedded)	4442 - 4463	1849.8
breccia flow	4463 - 4477	2335.8
Basalt. Andes	4477 - 4490	1770.6
Breccia flow with interbedded basalt	4490 - 4519	2014.0
Breccia flow	4519 - 4529	1809.2
Basaltic Andesite	4529 - 4553	2184.4

Inthology	Depth Interval	Ave susc.
Breccia flow	4553 - 4565	1718.8
basaltic And. & breccia flows interbedded	4565 - 4596	1859.6
Breccia flow	4596 - 4616	2229.7
Basaltic And	4616 - 4620	2353.1
Breccia flow	4620 - 4630	1865.7
Basalt And	4630 - 4636	2660.3
breccia flow	4636 - 4649	1989.8
basaltic And.	4649 - 4658	2672.6
breccia flow	4658 - 4694	1861.7
Basaltic Andes,	4694 - 4707	2161.1
Breccia flow	4707 - 4730	2363.5
interbedded Breccia and basalt flow	4730 - 4742	2190.0
Breccia flow	4742 - 4767	2155.7
Basaltic And	4767 - 4784	2043.5
Breccia flow	4784 - 4790	1559.9
Basaltic And.	4790 - 4796	2146.0
Flow Breccia	4796 - TD	?