



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTBH-1

GEOLOGIST(S) MCDANNEL / GOODWIN

FIELD CASCADES / CLACKAMAS

BASIS BINZ. MICROSOFT DATE 7/10/06

DEPTH INTERVAL	DESCRIPTION	
<u>2557'</u>	ANDESITE (A/A)	+ + +
M H A	(continued from p. 51) #(plag) w/ med dk gry unaltered blocks. Banding may be a primary flow feature or related to alteration & fracturing.	+ + + + + + + + +
M H A	2259' ANDESITE (^{2555'}) finely porphyritic; phenos of amphibole, pyx, plag, med dk gry. Fractures most common @ 20°. R white clay on fracture. Light clay alteration of matrix.	+ + + + + + + + +
M H A	<u>2566' - 2569'</u> - intense shearing, vertical to high angle (15°). Forms rubble.	+ + + + + +
M H A		+ + +
M H A	<u>2573' - 2575'</u> - intense shearing & rubble. Vertical & 45° waxy shear surfaces.	+ + + + + +
<u>2577'</u>	<u>2574'</u> - hairline fractures (w/v. lt. clay) @ 45°.	+ + + + + +
M H A L I M L A	<u>2580 - 2586'</u> - volcanic breccia - basal breccia. Lapilli & small blocks of andesite in ashy matrix. Groundmass minerals alternating to clays, pyx → hematite & clay. Common gry grn & white clay veinlets.	+ + + + + + + + + + + + + + + + + +
M H A L I M L A	2586' CRYSTAL-LAPILLI TUFF (airfall?) Overall color is lt. gry. Lt gry, med gry & red brn fine gr. intermediate to mafic lapilli of volcanic rock fragments in a matrix of ash sz rock fragments, abundant crystals (plag, pyx, amphibole?). Minor flattened pumice → clay. Ash is sparse. Subtle bedding defined by size variations in matrix & lapilli.	Δ Δ
M H A	<u>2586' - 2587'</u> - orange brn, ashy matrix. Oxidized by overlying andesite.	Δ Δ Δ Δ Δ Δ Δ Δ
<u>2597'</u>	<u>2594' - 2595'</u> - poorly consolidated. Dk green & pale blue secondary clays common. rock color to base of unit.	Δ Δ Δ Δ Δ Δ Δ Δ
L	<u>2596'</u> - grn clay seam along 30° fracture; below this point is lt. gry grn matrix.	Δ Δ Δ Δ

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGHI
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) Mc DANNEEL/GOODWIN
BASIS bioc. microscope DATE July 16, 1986

DEPTH INTERVAL	Fracturing	DESCRIPTION	
<u>2517'</u>	A ↓ L A	ANDESITE (A/A)	+ +
	↓ L M ↓ L ↓ A	<p style="text-align: center;">(2ndary)</p> <p><u>2526'-2532½'</u> Brecciation increases. Minor dk grn gray clay v.lets ± clear zeolites coat fractures. Fracture attitude variable, 30°-45° to ♀ most common. Rock remains well consolidated.</p> <p><u>2532½'-2539'</u> Base of flow marked by a change in color: rock is mainly brn gray, w/ pink brn & med. gray-related to incomplete mixing with the lower unit and chilling, respectively.</p>	+ +
<u>2537'</u>	↓ L A ↓ M A ↓ L ↓ A ↓ L	<p>Volcanic breccia - (agglomeratic by 2543')</p> <p><u>2539'-2552½'</u> Red brn & gray lapilli & blocks of andesite in an orange brn matrix of clay/ash. ± common free plag. & pyxo. x'tals. from 2543' to 2545' lapilli are flattened horizontally. Local fracture @ 150 to ♀ w/lt. clay shearing. Minor zeolites in vesicles ± clay (± quartz @ 2548'). (Pyroclastic breccia between flows)</p> <p>② <u>2550'</u> matrix changes color to moderate brn. Amphibole appears. suggests contact w/ unit below @ 2559'</p> <p>② <u>2552½'</u> ½ cm brn clay seam on fracture @ 45° & to ♀ marks contact with breccia of different character</p> <p><u>2552½'-2559'</u> Indistinctly banded, brecciated but consolidated andesite; wispy bands of pale yellowish brn, moderate yellow & red brn x'tal-rich matrix (clay, + amphibole (± 5mm), pyxo → red brn clay,</p>	+ +
<u>2557'</u>	↓		+ + + +



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1

GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS

BASIS _____ DATE 7-15-86

DEPTH INTERVAL		DESCRIPTION	
<u>2477'</u>	A	ANDESITE (A/A)	++++
			+++
			++++
			+++
	L		++++
	A		+++
			++++
	L	<u>2485'-2489'</u> rock takes on subtle pinkish cast which becomes pronounced by 2488'. Pheno sites have rims of oxidized red brn-most red iron w/light blue clay (rather than dk gmak) repl. phenos.	+++
	I		++++
	A	<u>2487'</u> ~12 cm zone intense fracturing, increased yel brn clay	+++
	L		++++
	L	<u>2490'</u> pervasive lt gm gry clay, mnr lt gry brn clay. Venetlets of whlt clay (zeolite?)	+++
	L		++++
	L		+++
<u>2497'</u>		<u>2495'</u> rock becomes ^{tectonically} brecciated w/minor dk gm gry matrix of finer rock frags & clay. Rock remains well consolidated. Mnz zeolite venetlets. (Brecciation is 2ndary feature)	++++
			+++
			++++
			+++
	M	<u>2504'-2512'</u> brecciation intensifies. Zeolite venetlets 5°-15° ϕ (acicular zeolite - natrolite?)	+++
			++++
	L	<u>2512'-2516'</u> Light fracturing. Rock color is lt. brn gray adjacent to fractures, otherwise lt gry. Light grn clay coats fractures.	+++
			+++
	L		++++
	A		+++
		<u>2515'</u> 8cm drusy cavity with several different zeolites successively coating light grn clay cavity wall (resinous tightly fitting stumpy columns \rightarrow radiating blades \rightarrow very fine acicular stals, all ~clear in color)	+++
			+++
			++++
			+++
			++++
<u>2517'</u>	A		+++
			++++



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CT64-1
FIELD CLACKANAS (CASCADES)

GEOLOGIST(S) GOODWIN/MCDANNEL
BASIS BRWC. microscope / DATE 7-15-86

DEPTH INTERVAL	DESCRIPTION	
<u>2437'</u>	VOLCANIC BRECCIA (A/A)	
M H	<u>2440'-2441'</u> red brn & dk gry breccia, w/ streaked & convoluted bands (~ flow banding). Red ashy matrix.	
M H	<u>2441'-2448'</u> increase in matrix (dk gm gry), angular to rounded lapilli & small block sz basaltic andesite w/ intermittent intervals (up to 15 cm thick) of red brn & blk banding a/a, w/ coarse lapilli-sz rock. Dk gm waxy shear surfaces (2444'-2448': increase in pale blue clay on fractures)	
I H I H I	<u>2448'-2453'</u> CRYSTAL TUFF? DK yel brn, waxy, ^{very} sheared clay w/ abundant xtls of plag & pyx → clay. Minor coarse ash-lapilli sz rock fragments (of intermed. composition) & porphyritic clay clasts. Unit becomes slightly less waxy & altered w/ depth (~2453') & is marked by disrupted black bands of basaltic material.	
I H	<u>2453'</u> ANDESITE	
<u>2457'</u>	med dk gry to v. lt. gry, porphyritic andesite ~10% phenos of plag, cpx & opx → All show clay alteration.	
L A L M	<u>2453'-2461'</u> bomb- & lapilli-sz gry blk - dk gry porph. andesite commonly flattened/elongated, in dk smg brn clayey matrix of coarse ash-sz rock fragments & xtls of plag & pyx. (Flow breccia?)	
L M A	<u>2461'-2476.5'</u> above grades into med dk gry porphyritic andesite @ 2469'. Phenos replaced by wht clay w/ minor pale blue cores.	
L L	<u>2476.5'</u> color changes to lt gry - v. lt. gry. Cpx phenos repl. by dk gm clay. Pale blue & pale gm clay pervasive throughout rock.	
<u>2477'</u>		

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) MEDANNEY/GOODWIN
BASIS binoc. microscope DATE July 14, 1986

DEPTH INTERVAL	Fracture	DESCRIPTION	
<u>2397'</u>	A	VOLCANIC BRECCIA (A/A)	
	L	<u>2401'-2412'</u> - gm grey breccia, as described above, often w/little matrix between rock fragments.	
	L		
	L		
	H		
	H		
	↓		
	M		
	L		
	L		
	M	<u>2412'</u> dk red brn ^{matrix} w/ blk, rounded, ^{vesicular} rock fragments & irregularly shaped blebs. Zeolites in vesicles.	
	↓	<u>2416'</u> red color intensifies & flow banding prominent.	
<u>2417'</u>	↓		
	H	<u>2419'</u> grades into ^{red} gry & becomes more homogeneous lava by <u>2422'</u>	
	M		
	↓		
	H	<u>2425'</u> gm grey breccia, a/a. Pale blue clay & gry grn clay on wavy, sheared, fracture surfaces.	
	A		
	M		
	↓		
	H	<u>2434'-2438'</u> Brn, blk & red brn breccia "dike" threads its way through lt. gry breccia w/ angular blocks & lapilli separated by thin clay seams suggesting little movement relative to "dike" (altitude 15° to // to ⊥). Dike may have been fluid and is composed of ash-sized volcanic fragments with disrupted margins.	
	↓		
	M		
<u>2437'</u>	↓		

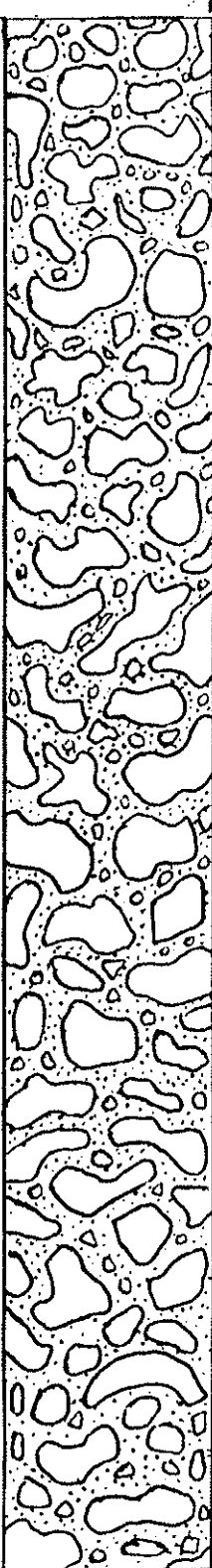
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTBH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) MCDANNEL / GOODWIN
BASIS BINDX SCOPE DATE July 14, 1986

DEPTH INTERVAL	Fracture L=light M=moderate H=heavy	A=absent I=intense	DESCRIPTION
<u>2357'</u>	L M H I I I		VOLCANIC BRECCIA (A/A) <u>2359' - 2372'</u> - red brn → blk, brn gry. Flow banding common @ angles of 30°-45°. FeOx (Limonite), rare clear zedite. Much of interval is rubblely.
			<u>2372' - 2379'</u> - grn gry breccia (consolidated), less matrix.
<u>2374'</u>	L A M I H I I I I A		<u>2379' - 2385'</u> - red brn, med-dk gry. Flow banding 45°-80°. Locally rubblely. <u>2385' - 2387'</u> - gm gry breccia (A/A) <u>2387' - 2391'</u> - gryish red, rounded, ± vesicles, basaltic and. blebs, minor bands. Sheared frac. surfaces. <u>2391' - 2401'</u> - brn gry (w/ minor red gry). Texture is subtle: med gry to dk red grey rounded frags. in red gry lava matrix
<u>2397'</u>	A		



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CT6H-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) MCDONNELL/GOODWIN
BASIS large microscope DATE JULY 13, 1986

DEPTH INTERVAL	Grading A=absent L=light M=moderate	H=heavy I=intense	DESCRIPTION
<u>2317'</u>	L		<u>2317'</u> Minor red brn oxidation marks flow boundary
	M		
	M		<u>2317.5'</u> LAPILLI TUFF
	H		16 cm thick interval: pale yel orng to mod yel brn. <1mm -
	H		5mm elongated clay clasts (appear to have been pumice
	M		lapilli, collapsed) & ± 5 cm angular lt. gry rock fragments
	H		of intermediate composition. (Some frags are irregularly shaped
	I		& have oxidized rims). In minor mod yel-dk yel brn clay
	M		matrix w/xtls of plag & pyx. Percentage of rock fragments in
	M		unit increases w/depth, grading into unit below:
	M		<u>2318'</u> VOLCANIC BRECCIA (well consolidated)
	M		DK gm gry, med dk gry, grayish red, mod red brn to brnish
	H		gry. Lt. med gry angular to subangular ^{lapilli-size} rock
	L		frags of mafic to intermediate composition in matrix of ash,
	M		smaller (to ≤ 1mm) rock fragments (afa), sparse xtls, & dk
	M		gm clay. Frequent, intermittent intervals of mod red brn
	L		& blk flow banded (+ stringers & blebs) lava → clay, ± minor
	H		vesicular/rarely scoriaceous, rounded blk to brn to red brn
	M		lapilli-sz fragments. (Flow banding, stringers & blebs
	L		suggest material was molten at deposition). Also, intervals
	M		of brnish gry basaltic andesite (typically, aphyne) w/
	L		more homogeneous texture & occasional subtle breccia.
<u>2337'</u>	H		(Breccia as described above ^{probably} of explosive origin).
	L		Minor clay, concentrated on fractured & often waxy,
	M		sheared surfaces of dk gm gry breccia. V. minor
	H		white veinlets & fracture coating of zeolites. (Clays
	M		are predom. dk gm, w/less pale bloc & red brn). Fractures @
	H		<u>2319.5'</u> rare laminations ^{~45°}
	L		<u>2318'-2325'</u> intermittent lt yel brn zones (~15cm-1m)
	L		w/ lighter colored (intermed-silicic) lapilli-sz volcanic
	L		fragments (i.e. rock fragments) & more tuffaceous matrix
	L		than most of unit.
	L		<u>2349-2351</u> - breccia has dk gm gry color.
<u>2357'</u>	L		



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGA-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) MCDARINEL / GOODWIN
BASIS BLIND. SCOPE DATE 7/12/86

DEPTH INTERVAL	DESCRIPTION	
<u>2277'</u>	BASALTIC ANDESITE (A/A)	
M ↓	2277'-2280' - hvy bn clay + tr limonite associated w/dk gry vesicular volcanic blocks (flow edge?)	
L ↓ H ↓ L ↓ H ↓ L ↓	2284'-2286' - gry bn - red bn vd. breccia: lapilli sz rock frags in ash matrix (flow boundary?). Much of matrix is clay. Mn shear on fracture surfaces. Zeolites on fractures in trace amnts.	
H ↓ L ↓ H ↓ L ↓	2286'-2288' - no brecciation of rock a/a (^{begin} @ 2264'). Rock is blue gm color.	
H ↓ L ↓	2288' - 7 cm red bn clay seam w/rock frags, offset ~4cm in shear zone. (description similar to 2284' above)	
H ↓ L ↓	2294'-2295' - vertical fracture w/heavy waxy (clay) shear. + seam of soft clay w/rock frags.	
<u>2297'</u>		
L ↓ A ↓ L ↓	2298'-2300' - mod bn, brecciated, w/ fractures @ 30°-45°. Clay along fractures, mod. shearing, pervasive clay alteration,	
M ↓ H ↓ L ↓	2301'-2305' volcanic breccia: mod red bn ^{to mod bn:} lapilli sz, often vesicular, basaltic andesite(?) clasts in matrix of clay (fm ash), ash sz rock frags, etc. Lt shear, tr. zeolites. Pyroclastic origin. Contact?	
H ↓ L ↓ L ↓	2305'-2317.5' - Interval above grades into basaltic andesite as described @ 2264'. Color is blue green. Rock is brecciated (tectonically) but consolidated.	
M ↓ H ↓ L ↓ H ↓ L ↓		
<u>2317'</u>		

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1

GEOLOGIST(S) GOODWIN / MCDANIEL

FIELD CASCADES / CLACKAMAS

BASIS B.N.C.C. SCOPE DATE JULY 11, 1986

DEPTH INTERVAL	Fracturing Intensity ↓	L: light M: moderate H: heavy	I: intense A: absent	DESCRIPTION
2237'	L			BASALTIC ANDESITE (A/A) 2237' rock is brecciated (tectonically) but well consolidated. V. minor matrix of dk grn clay. 2238' increase in vesicles. Clay & wht. zeolite fill vesicles 2239-2241' very fractured. Waxy shear surfaces.
	M			
	H			
	M			2240' VOLCANIC BRECCIA (pyroclastic origin) Lapilli & blocks, rounded to irregularly shaped, dense to vesicular basaltic andesite in a minor matrix of med brn clay, ash sz rock fragments & crystals (predom. plag.). Numerous small voids & vesicles filled w/ white zeolite & clays (pale blue & dk grn). Sheared waxy fracture surfaces. Predom. fracture direction 20°-35°
	L			
	H			2253' matrix increases; fracturing increases & rock becomes v. broken & rubbly. Shear on surfaces. Larger clasts in breccia have yel brn oxidized rims; other clasts have rims darker than remainder of clasts (chilling?). Fracture remains intense until 2259'.
2257'	M			
	H			
	M			2259' angular to sub-rounded lapilli sz rock fragments of med-dk grey mafic lavas in red brn to gry brn matrix of clay (from ash?), ash sz rock fragments, xfls. Some of fragments have convoluted, disrupted margins - suggesting deposition while in a molten/plastic state.
	M			
	H			2263' - 7 cm med rd brn clay w/ predom. ash sz rock frags. (AIRFALL?)
	L			
	M			2264' BASALTIC ANDESITE (tectonically) Dk grn gry-med red brn, aphyric. Brecciated but consolidated w/ lt-dk grn gry matrix. Vesicles contain clear drusy zeolite ± white, pale blue clays; uncommon vesicles of same. Short intervals of red brn (oxidized) volcanic breccia of basaltic andesite lapilli - some indicate deposition while molten/plastic. Pyroclastic origin appears most likely. Rare, finely disseminated pyrite → limonite/hematite. Intermittent shear on fracture surfaces.
	H			
	M			
	L			
	M			
	A			
2277'	L			



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE GTGH1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) MCDANNEL/GOODWIN
BASIS binoc. microscope DATE JULY 11, 1986

DEPTH INTERVAL	# Fractures / Interval	DESCRIPTION
2197'	0	<p>BASALTIC ANDESITE, aphyric w/g.m. ol → iddingsite, plag, pyx. ^{2200'-2224'} dk grn gry, local brecciation but rock well consolidated, fine gry grn clay ± clr zeolite veinlets, unfractured core w/ irreg. break</p> <p><u>2205 1/2'</u> 3cm drusy-lined irreg. cavity & v. lt. wht clay</p> <p><u>2208'</u> fine, wht, acicular zeolite in fractures fracturing remains minor, predom. along 45°-55°</p>
2217'	Lt.	<p><u>2224'-2230'</u> red brn. Mnr flow? breccia (12cm) passes into vesicular rock (Basaltic Andesite as described above), vesicles filled w/ clays & ^{wht} zeolites(?) white zeolites fill fracture (vein) @ ~ 20°. Probable contact</p> <p><u>2230'</u> - rock becomes greenish grey with same appearance as described at top of page.</p>
2237'		

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE July 11, 1986

DEPTH INTERVAL	DESCRIPTION	
<u>2157'</u>	BASALTIC ANDESITE (A/A) grayish red to med. red brn, aphyric, 0-15% (≅ 20mm) vesicles w/ ± drusy clr min ± clays, mod. to lt. fracture, sparse veinlets w/ zeolites & clay <u>2159' - 2164'</u> sparse vesicles	
0 2 1F 1F@15° 1F@15° 1F@15° 1F@15° 1F@15° 1F@15° 0 0 0 0 0 0 2 1@20° <u>2177'</u> 0 1@70° 0 0 0 0 2F@15° 1@90° 0 0 0 0 0 0 1@20° >5 1 0 1@vert. 3 3@45° <u>2197'</u>	<p><u>2171' - 2181'</u> dk grngry color, intermittent coarsening of matrix grain size to v. finely porphyritic with contact between porphyritic & aphyric sharp to diffuse, phenos: plag, ol, pyx (ol → iddingsite), few vesicles, increase in matrix alteration adjacent to fractures in coarser-grained intervals, unfractured exc. tiny veinlets A/A</p> <p><u>2184' - 2185'</u> Contact: bright orange brn, normally graded volcanic seds./tuff(?): 3" fine clayey ash abruptly changes to poorly-sorted xtal poor lapilli tuff w/ 2-3% plag (euhedral & sparkling) + pyx → clay in clay (devitrified ash?) matrix w/ sparse rounded to subangular red brn (→ clay) mafic to silicic lapilli-size rock fragments & 1 or 2 pumice clasts → clay</p> <p><u>2185' - 2200'</u> BASALTIC ANDESITE A/A, consolidated flow top breccia: grngry to lt brn, amygdular (w/ zeolites & clay), local heavy hematite alteration @ 2192' to 2195 1/2' (minor metallic pyrite → hematite in matrix), common fractures with brown clay & fairly coarse-grained drusy zeolites, v. sparse matrix material → lt brn clay ± hematite</p>	



CORE DESCRIPTION

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HOLE CTGH-1
FIELD CASCADES/CLACKANAS

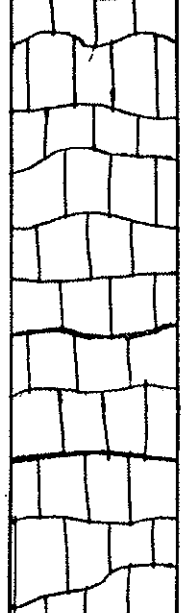
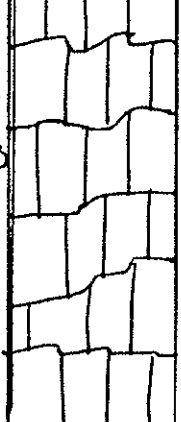
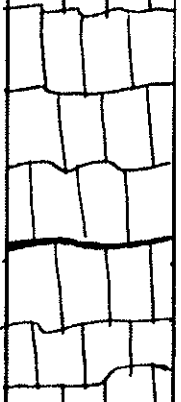
GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS biur. microscope DATE July 10, 1986

DEPTH INTERVAL	FRACTURE DENSITY	DESCRIPTION	
2117	# fractures per 1' interval (F denotes filled w/ secondary mins)	<p>BASALTIC ANDESITE (A/A)</p> <p><u>2120'</u> - seam of horizontal bn clay ~ 6cm thick</p> <p><u>2122'-2124'</u> - one 8mm wide ^{~.03in} vertical fracture filled w/ white mineral → clay & numerous smaller veinlets</p> <p><u>2124'</u> - rock becomes bn gry. Increase in vesicularity up to ~15%</p> <p><u>2126'-2126.5'</u> - rock becomes red bn. Flattened vesicles</p> <p><u>2126.5'</u> - return to bn gry color</p> <p><u>2127.5-2128'</u> - vertical fracture filled w/ white mineral → clay. Less prominent, thinner, variably oriented veinlets.</p> <p><u>2131'</u> - return to homogeneous dk gry color</p> <p><u>2137'-2139'</u> - 1 continuous vertical fracture, less prominent (minor) 45° & horizontal fractures</p>	
2137	0 2 @ 15° F 2 @ subvert, F 0 0	<p><u>2148'-2159'</u> gry ish red to mod. reddish bn, st. increase in frags & wht veinlets (= clay & drusy mineral), vesicles 2-15% mostly filled with wht, lt bn, or pale yel-orange clay, zeolites completely fill vesicles occasionally, common hematite, rare limonite, common clay alteration, (vesicles ≤ 20mm, vns ≤ 5mm)</p>	
2157	0 1 @ 70° 0		

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) MCDANNEL/GOODWIN
BASIS hand microscope DATE July 9, 1986

DEPTH INTERVAL	DESCRIPTION	
<u>2071'</u>	BASALTIC ANDESITE (A/A)	
	<p><u>2083'-2103'</u> unfractured interval w/ fewer zeolites, particularly below 2094' where vesicles become less common, two zeolites present: 'clr, as drusy fill & finely dissem. x'tals in fractures & voids, 2 pale yellow (less common) at base of interval as finely dissem. x'tals</p> <p><u>2088'</u> Contact: red-brn oxidation zone 3" wide w/ basal leached halo 3" wide</p> <p><u>2091'</u> Contact A/A</p>	
<u>2097'</u>	<p><u>2095'-2107'</u> intermittent coarsening of grain size, locally w/ appearance of brecciated v. finely porphyritic gabbro in basaltic andesite matrix, sharp to diffuse-edged xenoliths (?) 2"-10" across, mild clay alteration (5-15 mm wide) adjacent to rare fractures, intermittent fine web of wht zeolite v'lets</p> <p><u>2103'</u> heavy limonite, R+clr drusy zeolite?, & lt. clay on frac. @ 50° to 4</p>	
	<p><u>2107'-2111'</u> Increase in clay alteration: rock brnsh color</p> <p><u>2111'-2116'</u> Contact? red brn, increase in vesicularity, one large sinuous vertical crack begins at contact, filled with drusy zeolites (clr), heavy clay, common hematite (earthy)</p>	
<u>2117'</u>		



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1

GEOLOGIST(S) GOODWIN/MCDANIEL

FIELD CASCADES/CLACKANAS

BASIS WIKER. WIZINSKI DATE JULY 9, 1986

DEPTH INTERVAL	DESCRIPTION	
<p><u>2037'</u></p>	<p><u>2036'</u> - BASALTIC ANDESITE grnish blk to dk grnish gry to grnish brn. ^{grnish red} aphyric. gm. includes plag, pyx. pervasive dusky grn - dk grn & grnish blk clay altera- tion. Vesicles (up to 1.5 cm) common but not abundant, lined w/ clear drusy mineral (vapor phase?) & filled w/ clay → pale blue to dk gm. Minor veinlets of wht clay. Minor disseminated to drusy coating of clear secondary mineral on fracture surfaces. Heavy fracturing locally, 45° predominate & , sinuous vertical to sub-^{2064'} vertical less common. Brecciation common to <u>2040'-2057'</u> well consolidated breccia. <u>2055'-2065'</u> Blk brn - clay alteration lt. to med. w/ clear zeolite? A/A, R earthy hematite & limonite</p>	
<p><u>2057'</u></p>	<p>clay colors predominately brn & grn gry; wht, red brn, pale blue also present</p> <p><u>2067'</u> Contact: 3" limonite-stained interval between dk gry vesicular basaltic andesite flows</p> <p><u>2072'-2074'</u> Contact A/A with rock color altered to med brn</p> <p><u>2076'-2079'</u> Fracturing @ 15° is sinuous & vertical, increase in zeolite veinlets (≤ 3mm wide) & clay (brn), mod. brecciation but core consolidation is good, color: med brn, 40mm drusy vesicle at base</p>	
<p><u>2077'</u></p>		

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscop. DATE July 8, 1986

DEPTH INTERVAL	DESCRIPTION	
<u>1997'</u>	<p>BASALTIC ANDESITE (VA) 1990' (cont.) dk brn, mod. brn, dk grn gry clay <u>1992½' - 2000½'</u> Intensely brecciated, 50% rubble, frags @ 45° to 45°, mostly dk gry grn & brn clays as coatings/fill <u>2004' - 2030'</u> Intensely brecciated, frags @ 40°, 80° rubble, overall color is greyish green to dusky green. abundant clay.</p>	
<u>2017'</u>	<p><u>2030' - 2035'</u> color changes to dk yel brn. Rock remains rubble. <u>2035'</u> - ~1' mod. red brn clay - CONTACT</p>	
<u>2037'</u>		

CORE DESCRIPTION

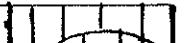
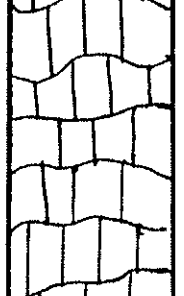

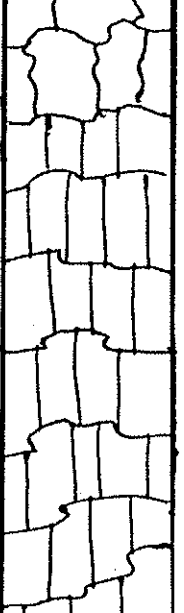
40 FOOT INTERVAL

HOLE CTGH-1

GEOLOGIST(S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS

BASIS 6mm. microscope DATE July 8, 1986

DEPTH INTERVAL	DESCRIPTION	
<u>1957</u>	<p>BASALTIC ANDESITE (A/A)</p>	
	<p><u>1967'-1969'</u> Contact - rock becomes brecciated and color changes to grayish black with minor reddish brown</p>	
	<p><u>1969'</u> VOLCANIC BRECCIA</p> <p><u>1969'-1970.5'</u> Angular to subrounded lapilli - to coarse ash-sized rock frags. of mafic to silicic composition in a fine red brn. matrix of ash → clay (waxy) & mn. ash-sz r.f.s. Crude bedding defined by clast size & variation in % matrix.</p> <p><u>1970.5'-1979'</u> Lt. med gry to olive gry, commonly vesicular, basaltic andesite blocks (predominate) & lapilli in a coarse matrix of fine yel. brn ash. B.A. beds may have dark (chilled?) or irregular (disrupted?) margins suggesting deposition in a plastic/melted state. Shear is common on fracture surfaces. Gradational basal contact.</p>	
<u>1977</u>		
	<p><u>1979'</u> BASALTIC ANDESITE</p> <p>brn gry to gry brn, v. finely & sparsely porphyritic (~1%) to aphyric, phenos: plag, pyx → clays & limonite, ol? → clay, common lt. alteration of matrix to clay (esp. adjacent & within fractured intervals), common brecciation, mod-mod+ clays filling in many vesicles + coating all fracs. & filling all voids (mod brn, dk grn gry, lt gry, pale blue, wht, orange brn...), R clear soft zeolite? occurring as drusy void coating & individual sm. xtals, vesicles to 1986'</p> <p><u>1979'-1984'</u> Vesicular chilled-edged boulders w/ brn secondary? clays @ edges (MAY BE PART OF UPPER V.C. unit) = flow top breccia</p> <p><u>1979' & below</u> intermittent lt. grn clay in tiny pill-shaped grains irregularly aggregate in fractures & vesicles</p> <p><u>1986'-1990'</u> intense fracturing & brecciation, 50% rubble of smaller than 1" x 1" frags, fracs @ 15° to 45° & filled with thin</p>	
<u>1997</u>		



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE JULY 8, 1986

DEPTH INTERVAL	DESCRIPTION
<u>1917'</u>	<p>BASALTIC ANDESITE (AVA) @ 1917' rock frags. fairly easily along preexisting parting planes @ 30°, 45° ± sinuous vertical</p>
	<p><u>1927'</u> 1' zone of intensely fractured/rubby core</p>
	<p><u>1928'</u> moderately fractured. Predominate fracture direction is 45°, less commonly ~75° & vertical. Thin ^{dk green} clay seam along vertical fracture @ 1936'</p>
	<p><u>1937'</u> - fracturing increases. Rock somewhat rubby @ 1940' - 1945'. High angle (~vertical) & 45° predominate.</p>
<u>1937'</u>	<p><u>1945' - 1947'</u> - angular brecciated clasts, in place w/ thin clay veinlets.</p>
	<p><u>1948'</u>: rock becomes well consolidated & has few fractures. Fracture tends to be ~horizontal.</p>
<u>1957</u>	



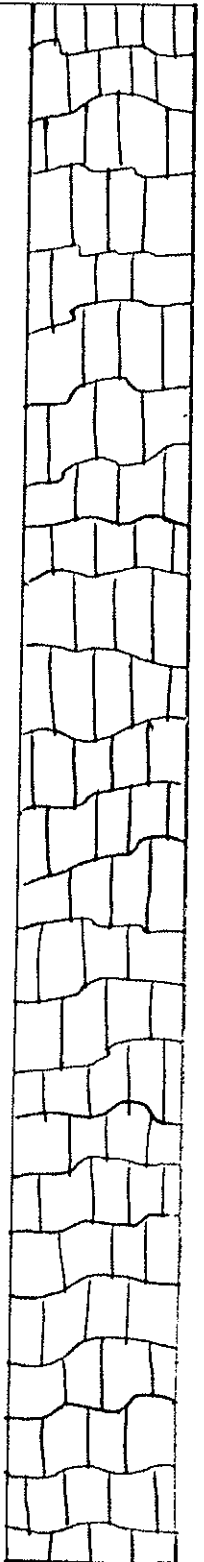
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE July 7, 1986

DEPTH INTERVAL	DESCRIPTION
1887'	<p>BASALTIC ANDESITE dk gry, finely porphyritic (1%), phenos: (<2mm) plag. & cpx., mod. amt gray, green, & lt. blue clays, ± minor subtle greenish clay also in groundmass; phenos. show little to no alteration. Fracturing is light/not widespread, mainly 45°-50° to ϕ & minor subvertical \approx 30° - often with light coating of brn, blk, dk gry gm clay</p>
1907'	
1917'	<p>1910'-1917' Common intersecting sinuous vertical fractures with brn & blk clays coating fractures</p>



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CT6H 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) GOODWIN/MCDANNELL
BASIS/BINOC. MICROSCOPE DATE 7/7/86

DEPTH INTERVAL	DESCRIPTION
<p>1847'</p>	<p>BASALTIC ANDESITE (A/A) 1836'-1845' ^(tectonic) Breccia zone, well consolidated. Dk gm clay m fractures. 1851'- increase in vesicularity (1851'-1872' flow transition) 1853' & a/a @ 1826', (vesicular to dense blocks & lapilli of ^{through pyroclastic breccia} 1863') basaltic andesite, irregular margins, in mmr dk yel brn & olive gry matrix. 1869' Matrix becomes red brn w/ vesicular mafic fragments common & increase in ash component of matrix (suggests pyroclastic origin). Zeolites occur in voids between some fragments.</p>
<p>1867'</p> <p>1872'</p> <p>1887'</p>	<p>BASALTIC ANDESITE Dk gry, v. finely & sparsely porphyritic (<1%). Phenos (<2mm): plag, cpx. Mod. aut. dk greenish gry to greenish black & less common, pale blue clays on fracture surfaces. \pm minor, subtle greenish clay in groundmass. Phenos show little to no alteration & rock appears fresh. Fracturing is not pervasive & varies in intensity & fracture angle; 45° & ~ vertical & often predominate. 1871½'-1890': mmr platy partings @ 45° & 60° \angle, \pm dk gn clay, controls fracturing.</p>



CORE DESCRIPTION

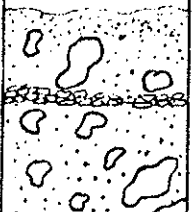

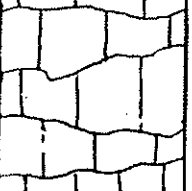
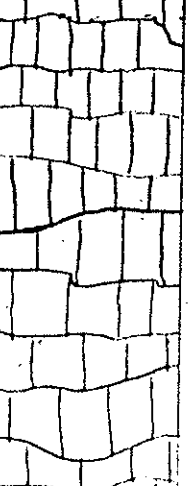
40 FOOT INTERVAL

HOLE CTGH-1

GEOLOGIST (S) MCDANIEL/GOODWIN

FIELD CASCADES/CLACKAMAS



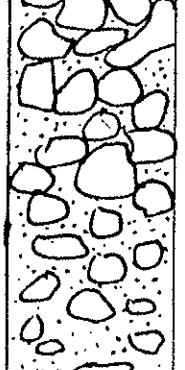
BASIS bmcc. microscope DATE 7/6/86

DEPTH INTERVAL	DESCRIPTION	
<u>1807'</u>	<p>ANDESITE (A/A)</p>	+ + +
	<p><u>1809'-1810'</u>: ≥ 30 mm clay seam assoc. w/ sinuous frac @ 30° to ⊥</p>	+ + + + + + + + +
	<p>@ <u>1814'</u>: microfractures & aligned small voids (@ 0.5-1 cm interval) @ 90° ± 10° to ⊥ 20% filled w/ thin mod bm or gm gry clay seams</p>	+ + + + + + + + +
	<p><u>1817'-1820'</u>: heavy fracturing & clay above 4' breccia & oxidation horizon (pinkish red)</p>	+ + + + + +
	<p><u>1820'</u> VOLCANIC BRECCIA Mod. dk yel, omg bm, red bm. Coarse ash sz & lapilli sz heterolithic rock fragments & ^{minor} very lt. grey dense pumice (often containing hornblende, ± magnetite) commonly flattened, in a tuffaceous matrix which includes glass, hornblende, ash. Unit has slight changes every 2-6 cm -- i.e. change in color, clast: matrix ratio, clast size -- which gives a crudely bedded appearance. Minor shear visible on fracture surfaces. (Much of unit appears to be pyroclastic airfall mat'l.)</p>	+ + + + + + 
<u>1827'</u>	<p><u>1826'</u> ~10 cm of ash & ash sz rock frags w/ clasts</p>	
	<p><u>1825'-1826'</u> - reddish omg waxy matrix (from ash?)</p>	
	<p><u>1826'</u> BASALTIC ANDESITE Dk gry to grnsh blk, rare microphenos of plag. P. lathitic texture. Brecciated (tectonically) intervals are typically consolidated. Dk grnsh clay on surfaces of fractures & filling many vesicles. No predominate fracture angle/direction, generally 40° - vertical. ^{Minor white clay in some vesicles.} <u>1826'-1835'</u> volcanic "breccia" at top of this unit composed of dk gry vesicular blocks of basaltic andesite described above, w/ irregular boundaries/margins suggesting fluidal/molten deposition. Matrix (~30%) of lt olive, olive & dk yel bm ashy material. Minor clay shear on fractured surfaces</p>	
<u>1847'</u>		

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE July 6, 1986

DEPTH INTERVAL	DESCRIPTION	
<u>1767'</u>	ANDESITE (A/A)	+ + +
		+ +
<u>1781 1/2'</u>	<u>1781 1/2'</u> Contact is mod. reddish brn & contains angular rock fragments	+ + +
<u>1781 1/2'</u>	VOLCANIC BRECCIA (predominately pyroclastic frag.) moderate reddish brn, lapilli- and block-sz andesite scoria and, less commonly, med. gry andesite rock fragments in a sparse ashy to clayey matrix. Cmn. shear on fracture surfaces. Matrix ash-sz clasts includes mafics → clay & FeOx & plag. → clay. Frac. clays are lt. gry to mod. FeOx. Sparse 3-15mm voids have lam's v. pale brn, lt. brn, red brn clays which may drape around clasts. Chr. drusy zeolite also present on fracs. Top of unit has agglomerate appearance.	
<u>1787'</u>	<u>1796'-1798'</u> color changes to med. dk gry, matrix % increases slightly.	
	Elongated clasts are horizontal 1' above basal contact.	
<u>1798'</u>	ANDESITE	+ + +
	brn gry to med gry, v. sparsely porphyritic (≤ 1%): plag & pyx → clay & FeOx (≤ 5mm), commonly vesicular w/ gry-grn clay filling ≤ 50%, 2ndary wht, lt brn, & gry-grn clays commonly coat fractures, reddish prismatic zeolite? occurring A/A	+ + + + + + + + + + + + + + + + + +
<u>1807'</u>	<u>1803'-1806'</u> Common irregular ^{oblongated} vesicles (1-5mm voids) with variable orientations	+ + + + + +

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTBH-1

GEOLOGIST (S) McDannel/Goodwin

FIELD CASCADES/CLACKANAS

BASIS _____ DATE _____

DEPTH INTERVAL	DESCRIPTION	
<u>1687'</u>	VOLCANIC BRECCIA (A/A) <u>1687'</u> soft bn clay partially filling void, sticky core	
<u>1694'</u>	<u>1694'</u> sharp 45° ↘ contact w/ underlying unit ANDERSITE Med gry to dk grey to brownish gry. Porphyritic (1-3%) phenos: plag + pyx. Pyx → clays. Secondary clay coat (lt. to mod) fracture surfaces: lt bn, lt drk gry, pale blue, reddish bn, with mod yel. Pyroclastic on frac. surfaces. Groundmass matrix altered to clay. Generally, unit is very fractured w/ zones (~.6m) of consolidated rock. Incipient fracture marked by hairline cracks, which may be filled w/ clays. Most prominent frac. direction ~45°. less prominent 90° & ~vertical.	+ +
<u>1707'</u>	<u>1694'-1702'</u> intervals (.5-10cm) of med or pink, mod bn, lt. bn gry lams. ash → clay <u>1708'</u> abrupt color change to brownish gry. Rock is v. fractured (~1m). Dendritic MnO or FeO (black).	+ + + + + + + + + + + + + + +
	<u>1716'</u> : green clay alteration of matrix changes to reddish yellow clay.	+ + + + + +
	<u>1721'</u> : plag phenos decrease	+ + + + + +
	<u>1728' - 1731'</u> : splintery, vertical fracture predominates, pheno content appears to decrease @ 1728'	+ + + + + + + + + + + + + + + + + +
<u>1727'</u>		+ + + + + +

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1
FIELD CASCADES / CLACKAMAS

GEOLOGIST (S) MCDANNEL / GODDWIN
BASIS binoc. microscope DATE 7-3-86

DEPTH INTERVAL	DESCRIPTION	
1647'	<p>1647' - BASALTIC ANDESITE / ANDESITE</p> <p>lt olive gry, lt. med. gry, and brn gry; sparsely porphyritic ($\leq 1\%$) phenocrysts: plagioclase, pyroxene (?) altered to clay. Small aligned vesicles 0.5-2.0 cm apart \pm secondary clay define banding @ 60° to \perp. Fractures are most commonly @ 45°. Clay coatings are lt. brn. dk. gry gry, and mod. orange pink. Minor limonite present adjacent to fractures. \mathcal{R}. pyrolusite, psilomelane? Moderate amt. fracturing. @1655' clear, elongate tabular secondary mineral/zeolite? forms drusy coating on fracture surface.</p> <p><u>1658.5' - 1659.5'</u> Intense fracturing</p> <p>@1662' Yellow staining (FeOx?) adjacent to clay- and pyrolusite-coated fracture</p> <p>Irregular, sharp basal contact</p>	
1667'	<p>1666.5' - 1694' VOLCANIC BRECCIA</p> <p>Mottled coloration: dk to mod. red brn, red gry, med. dk gry, olive gry, brn gry, pink gry. Angular to subrounded lapilli - sz to sm. block - sz. heterolithologic (ophytic to finely porphyritic, dense to vesicular, ^{composition} predominately mafic to intermediate but includes v. lt. gry to whit. clasts suggestive of more silicic composition) volcanic rock fragments. Some clasts may have been molten, appear plastically deformed, and have irregular, disrupted margins. Laminations of fine ashly material are typically discontinuous, disrupted, $\frac{1}{2}$ have small-scale crossbedding. % matrix variable. Cmn. fracture clay shearing. Min. fracturing with variable attitude. \mathcal{R}. fine, clr. drusy zeolite s on fractures. Lt. amt. 2ndary clay, limonite.</p> <p>@1675' \mathcal{R} finely disseminated tabular Fe? sulfide in clay</p> <p><u>1677' - 1682.5'</u> Reddish brn to mod. brn; angular to subrounded lapilli - sz volcanic clasts in ashly (to clayey) matrix, crude thin bedding @1681' composed of sm. lapilli - $\frac{1}{2}$ ash - sz r.f.s., waxy clays, clasts oriented @ 45° @1682.5' increase in size $\frac{1}{2}$ % of andesite blocks from underlying unit.</p>	
1687'		



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CT64-1
FIELD CLACKANAS/CASCADES

GEOLOGIST (S) GOODWIN/MCDANNO
BASIS FINZ. MICROSCOPE DATE 7/3/86

DEPTH INTERVAL	DESCRIPTION	Diagram
1607'	<p>VOLCANIC BRECCIA (A/A)</p> <p>1594' - unit becomes abruptly coarser & darker grey. predom. lapilli size material (rock frags)</p> <p>1597' - abrupt contact w/ interval of ash - sm lapilli sz fragments in ash matrix w/ palagonite</p> <p>1599' - coarser & darker (grey) a/a @ 1594'. Change in ratio of clasts: matrix, clast size creates subtle bedding.</p> <p>1610'-1617' - this interval is more "tuffaceous" than above intervals, as there is an increase in ash & pumice. Thin ash (> clay) laminae mark end of this interval</p> <p>① 1618' - largest larger percentage of air-fall material.</p> <p>1619' - clast supported interval of small lapilli to ash sz rock fragments & palagonite. Grades into interval of ash sz fragments & 4 cm of small scale, cross-bedded ash → clay.</p> <p>1627'-1629' - unit becomes unconsolidated</p>	
1627'	<p>1630'-1639' - ^{marked} change in character. Dk grey, vesicular to dense blocks & less commonly, lapilli of basaltic andesite w/ irregular margins, some disrupted, suggesting deposition while molten & plastic. Clasts are 60%-80% of interval. Matrix of dk yel brn - brn grey to olive grey, fine ash w/ ash size rock frags. Mnr. laminations in matrix between clasts.</p> <p>1644'-1646' - ^{Asdur} Matrix becomes red brn. Lapilli (no blocks) of grey-red brn - olive rock frags.</p> <p>1646'-1647' - Vesicular ^{basaltic andesite/andesite} boulders w/ olive & reddish clays filling vesicles. Grades into andesite unit below.</p>	
1647'		



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CT6H-1

GEOLOGIST(S) MCDANIEL / GOODWIN

FIELD CLACKAMAS / CASCADES

BASIS BINOC. MICROSCOPE DATE 7/3/86

DEPTH INTERVAL	DESCRIPTION	
1567'	<p>ANDESITE (A/A)</p> <p>1570 VOLCANIC BRECCIA Med dk gry & gry bm. Sub-angular to sub-rounded lapilli and block sz rock fragments of mafic-intermediate lavas in ashy bm matrix of ash sz rock fragments, clay (from ash?), & crystals of plag, pyx, hbde. Unit changes character throughout its thickness: thin, cross-bedded, laminated intervals of ash sz rock fragments, intervals w/palagonite common, intervals w/ disrupted/irregular margins on basaltic andesite, suggesting molten deposition. Pyroclastic & surge origin is suggested by much of these characteristics. Generally, unit is clast supported. Voids may occur between small lapilli. Pale blue to med bluish gry clay coats fractured surfaces. Fine, clear, acicular to prismatic (?) mineral on broken surfaces & in voids is probably zeolite. R pyrite → FeOx.</p> <p>Upper part of unit is transitional w/ ^{andesite} unit above 1570'. 1570 - 1573.5 Volcanic breccia contains predominantly lapilli & ^{large} blocks of andesite (a/a) in ashy matrix w/ mnr clay. 1575' - 1583' return to dense, andesite flow a/a (may be large block in breccia?) 1590' - small lapilli interval grades into thinly bedded-laminated, lt bm interval of ash sz rock frags (~15 cm thick). 1592' - 8 cm of rhythmically ^{thin} bedded & laminated ash sz rock fragments & ash (→ clay). Top of this interval marked by erosional contact overlain by small lapilli supported by gel bm palagonitic, ashy matrix. (Suggests surge/hydroclastic ^{possible} deposit.)</p>	
1587'		
1607'		

CORE DESCRIPTION

40 FOOT INTERVAL

 HOLE CTGH-1
 FIELD CASCADES / CLACKAMAS

 GEOLOGIST (S) MCDANNEL / GOODWIN
 BASIS binoc. microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION	
1527	ANDESITE (A/A)	+ + +
	<u>1522'-1524.5'</u> : breccia w/ clay seams up to 1 cm thick	+ + + + + +
	<u>1526'-1529'</u> : breccia w/ clay, A/A	+ + + + + +
	<u>1530'</u> : unit is slightly more porphyritic at this depth than at shallower levels -- largely due to increase in hornblende? Color is med. H gry	+ + + + + +
	<u>1530'-1536'</u> - short intermittent fractured & brecciated zones w/ heavy clay.	+ + + + + +
	<u>1536'-1547'</u> - Horizontal clay-filled joints, ^(incipient fractures) become rare & rock is less fractured. Clay diminishes. MnO dendrites prominent.	+ + + + + + + + +
1547'	<u>1547'-1557'</u> - fracturing resumes. Oriented 30°, 75°, less commonly 45°. Vertical clay seams (1546' 8mm long; 1548' 10cm long, 4mm wide) contain brecciated rock fragments.	+ + + + + + + + + + + +
	<u>1557'-1564'</u> - intense fracturing resumes	+ + + + + +
	<u>1561'-1564'</u> - breccia, heavy brown clay	+ + + + + + + + +
	<u>1560'-1570'</u> - Fine-scale color banding of matrix: 2-15mm bands @ 70° & to E, med. lt. gry & med. dk. gry, long axes of phenos. also oriented in same plane @ 70° & to core length, 5cm rounded xenoliths com. @ base of interval	+ +
1567'		+ + + + + +

CORE DESCRIPTION

40 FOOT INTERVAL

 HOLE CTGH-1
 FIELD CASCADES/CLACKAMAS

 GEOLOGIST (S) GOODWIN/MCDANIEL
 BASIS know. microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION	
<u>1487'</u>	<p>ANDESITE (A/A) w/hornblende becoming more abundant pheno phase.</p>	+ + + + + + + + + + + + + + + + + +
	<p><u>1491'</u> - 8" vertical clay seam, ~10 mm diam. brecciated appearance: angular clay pieces in lighter ^{color} clay matrix.</p>	+ + + + + + + + + + +
	<p><u>1494'</u>: fracture attitude most commonly 30° † horizontal.</p>	+ + + + + + + + + + + + + +
	<p><u>1500'</u>: increase in horizontal "incipient fractures", as marked by ^{thin} clay filled joints. ≤2cm - 7cm apart</p>	+ + + + + + + + + + + + + + +
	<p><u>1503'</u> - highly fractured. Brecciated. Fracture orientations vertical to 10°, 30°, † ~horizontal.</p>	+ + + + + + + + + + + +
<u>1507'</u>	<p>Brecciated rock frags in clay seam ~1.5 cm wide, 12 cm long.</p>	+ + + + + + + + + + + + + + + + + +
	<p><u>1513'</u>: less fractured. Strong horizontal jointing. Thin, 1-6 cm apart. ^{lt} yellow stain & clay fill emphasize joints.</p>	+ + + + + + + + + + + + + + + + + + +
	<p><u>1515'</u>: Increase in amount of dark, platy, metallic mineral. Found in conjunction w/ previously described clear (to white) tabular mineral (crusy on some fac. surfaces), yellow stain assoc. w/ this mineral on some fracture surfaces.</p>	+ + + + + + + + + + + + + + + + + + +
<u>1527'</u>		+ + + +

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION	
<u>1447'</u>	ANDESITE (A/A) med. gry, locally rubblely & intensely fractured w/ mod.-heavy clay filling fractures, R+pyrolusite also on clays/fracture surfaces, plag → clay (wht) adjacent to fractures, seams of clays commonly v. pale orange and mod. brn; plag., pyx., and less common hbl phens, a/a: 1-3% (sparse) Clear, tabular mineral abundant on frac. surfaces. + R platy dark metallic mineral	+ +
	<u>1454'-1455'</u> Intraformational breccia zone (30+mm thick) w/ heavy clay (tectonic breccia)	+ + + + + + +
	@ <u>1457'</u> 10mm clay-filled fracture @ 45° to ϕ <u>below 1450'</u> : Subhorizontal banding on scale of 1-5mm continues as subtle mod. gm yellow stain (w/ associated v. lt. clay alteration & R+pyrolusite) interbanded w/ med. gry unaltered andesite. Milky to clear tabular & acicular zeolites in small voids.	+ +
<u>1467'</u>	<u>1462'-1464'</u> Fractured interval w/ heavy clay: seams ≤ 30 mm wide	+ + + + + + +
	<u>1466'-1466½'</u> Heavy fracturing w/ lt. clay	+ + + + + + +
	<u>1471'-1472'</u> A/A w/ heavy clay	+ + + + + + +
	<u>1476½'-1485'</u> Less fractured interval, occasional irregular break \perp to ϕ along subhorizontal "incipient platy fracture" partings*, <u>1476'-1482'</u> : clayey breccia seams w/ mod gm yellow alteration / stain (sim. to that above @ 1445') no mins. visible * i.e. rock unbroken though partings provide planes of weakness for separation	+ +
<u>1487'</u>	<u>1485'</u> fracturing - 4"-8" lengths. Orientation variable but vertical to 10° (w/ splintery) is prominent.	+ + + + + + +

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/KLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION	
<u>1407'</u>	<p>ANDESITE (A/A) <u>1404'-1412'</u> sinuous conjugate fracture set @ 245° to ϕ <u>1412'-1418'</u> conjugate fracture set @ 30° to ϕ, rubbly interval w/ heavy clay</p>	<p>++++ +++ ++++ +++</p>
	<p><u>1415'-1420'</u> - breccia w/ heavy clay. Prominent yellow stain rims brecciated rock fragments, more subtle stain continues to 1445' adjacent to clay-filled fractures - no mineral observed, just staining</p>	<p>++++ +++ ++++ +++ ++++ +++</p>
	<p><u>1421'-1438'</u> Intermittent vertical sinuous fractures (≤ 15 mm wide) filled w/ clays \pm clayey breccia, locally rubbly</p>	<p>++++ +++ ++++ +++</p>
<u>1427'</u>		<p>+++ ++++ +++ ++++ +++ ++++ +++ ++++ +++</p>
	<p><u>1438'-1445'</u> Light fracturing w/ orientation @ 15° to ϕ, often as conjugate joint sets</p>	<p>++++ +++ +++ ++++ +++</p>
<u>1447'</u>	<p><u>below 1445'</u> sinuous vertical fractures w/ clay seams/coatings continue</p>	<p>++++ +++ +++</p>



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) MCDANNEL/GOODWIN
BASIS binoc. microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION	
<u>1367'</u>	ANDESITE (A/A)	+ + + +
		+ + +
		+ + + +
		+ + +
		+ + + +
		+ + +
		+ + + +
		+ + + +
		+ + +
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		+ + +
	<u>1380'-1387'</u> Vertical fractures predominate over horizontal fractures	+ + + +
		+ + +
		+ + + +
		+ + +
		+ + + +
		+ + +
<u>1387'</u>	<u>1387'-1402'</u> Fractures generally ~45° to 45° & less commonly vertical	+ + +
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	<u>1402'</u> : frac. orientation most commonly ~45°, less commonly is vertical. Breccia & heavy clay.	+ + +
		+ + + +
		+ + +
		+ + + +
<u>1407'</u>	<u>1406'</u> : yellowish tint on frac. surf.	+ + + +



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1

GEOLOGIST(S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS


BASIS binoc. microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION	
<u>1327'</u>	<p>ANDESITE (A/A) med. dk. gray, sparsely porphyritic, ^{intense} pervasive vertical fracs. w/ anastomosing v. thin veinlets of yellow-brn clay filling fractures</p>	<p>++++ +++ ++++ +++ ++++ +++</p>
	<p><u>1335'</u> - fracturing persists but is not as intense a/a</p>	<p>++++ +++ ++++ +++ ++++ +++ ++++ +++ ++++ +++</p>
<u>1347'</u>		<p>+++ ++++ +++ ++++ +++ ++++ +++</p>
	<p>{ <u>1352'</u> - frac. orientation: predom. ~10°, also 45°-70° { <u>1387'</u></p>	<p>++++ +++ ++++ +++ ++++ +++ ++++ +++ ++++ +++ ++++ +++ ++++ +++ ++++ +++</p>
<u>1367'</u>		<p>++++</p>

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CT6H-1
FIELD CASCADES/CLACKANAS

GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS BINOX. MICROSCOPED DATE 7/1/86

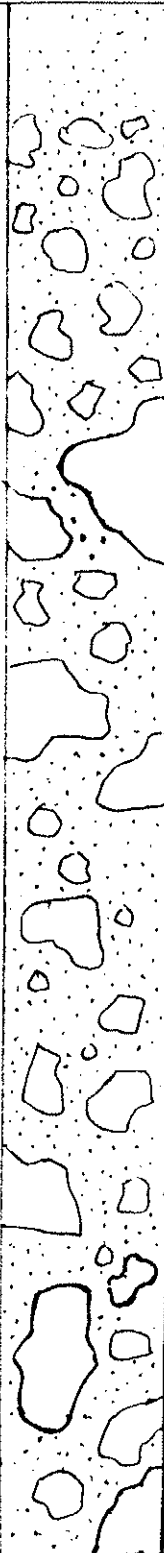
DEPTH INTERVAL	DESCRIPTION	
<u>1287'</u>	VOLCANIC BRECCIA (A/A)	
	<p>1291' ANDESITE</p> <p>Pale med bn (1300-1306) to med dk gry, sparsely porphyritic (3-5%) w/phenos of plag, opx, cpx, hblde, & common open textured crystal clots (<4mm). Mn'r plag alteration → clay; amphibole is resorbing. Common pale orange-pink clay coating & filling fractures. R MnO or FeO (black). Clear-white tabular mineral (associated w/small mafic mineral (secondary?) in thin veinlets & coating fracture surfaces) is probably zeolite. Pervasive vertical to 25° anastomosing, thin, closely spaced (<0.5cm) veinlets of yellowish bn clay & zeolite (a/a) appear to be formed along shears(?). R dark, platy, metallic mineral on fracture surfaces.</p>	<p>++++ ++++ ++++ ++++ ++++ ++++ ++++ ++++ ++++ ++++ ++++</p>
<u>1307'</u>	<p>Top part of flow is very broken & clayey (yel bn, 9/16). ~0.3m red bn ash 1297'-1298', may indicate association of top of andesite unit w/VOLCANIC BRECCIA above.</p>	<p>++++ ++++ ++++ ++++</p>
	<p><u>1312-1315'</u> - rubble - w/clay containing small (<1cm) rock fragments</p>	<p>++++ ++++</p>
	<p><u>1318'</u> - very fractured w/heavy, red bn clay. Fracture has no preferential orientation. Anastomosing yel bn clay veinlets/shear (a/a) not as prominent.</p>	<p>++++ ++++ ++++ ++++</p>
	<p><u>1325'-1335'</u> - zones of intensely fractured rock interspersed w/consolidated zones. Fracture orientation 35°-45°</p>	<p>++++ ++++ ++++ ++++</p>
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		<p>++++ ++++</p>
<u>1327'</u>		<p>++++ ++++</p>

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE 6/30/86

DEPTH INTERVAL	DESCRIPTION	
<u>1247'</u>	VOLCANIC BRECCIA (A/A)	
	<u>1254.5'-1255.5'</u> : Rubbly interval	
	<u>1260'-1261'</u> Rubbly interval. First appearance of sheared? clasts from underlying andesite unit.	
<u>1267'</u>	<u>1270'-1271'</u> Rubbly interval	
	<u>1278'-1292'</u> Rubbly interval	
<u>1287'</u>	<u>1280'</u> - clasts in breccia are predominately angular lapilli of underlying, sheared andesite.	

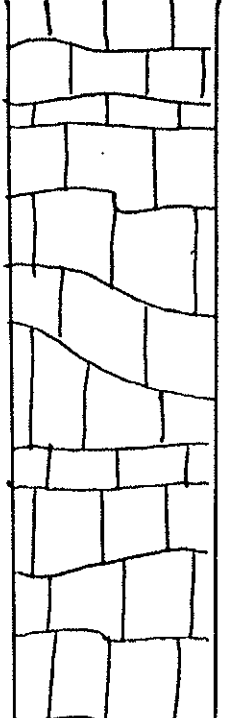
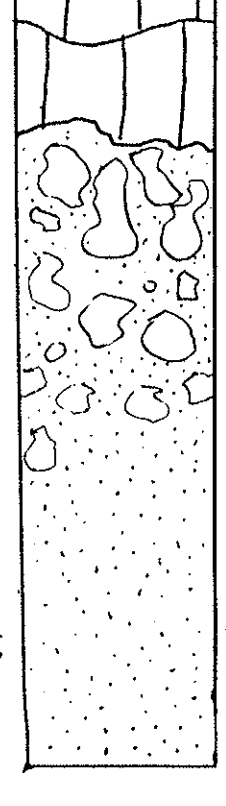


CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) MCDANIEL/GROWIN
BASIS BINGE. SCOPE DATE 6/30/86

DEPTH INTERVAL	DESCRIPTION	
<u>1207'</u>	BASALT (A/A)	
	<p><u>1215'-1229'</u> - ~80° fracture common; continuous vertical fracture</p> <p><u>1223'</u> - black, secondary mineral (MnO₂)(FeO?) rimming phenos on fracture surfaces</p>	
<u>1227'</u>		
	<p><u>1229'</u> - flow becomes oxidized (brick red) & brecciated but well consolidated. Grades into ^{red}clay matrix w/ clasts of basalt and conder & plag xtls. Grades into underlying unit.</p> <p><u>1230'</u> VOLCANIC BRECCIA (surge &/or air-fall origin?) Red-orange - brn. Sub-angular to subrounded lapilli- & block- of dk gray ^{of dk gray} & red brn (oxidized) basalt & basaltic andesite. [Basaltic frags of above unit at top of volcanic breccia unit] in Matrix of ash (→ clay), ash-sz rock fragments, crystals. Unit is not uniform but has sub-units (16cm-1.3m) based on variable clast size, clast to matrix ratio, laminated intervals. Contacts between these units is gradational to abrupt. Unit becomes more uniform @ 1261'. Laminations in matrix are commonly disrupted & drape around lapilli/blocks.</p>	
<u>1247'</u>		


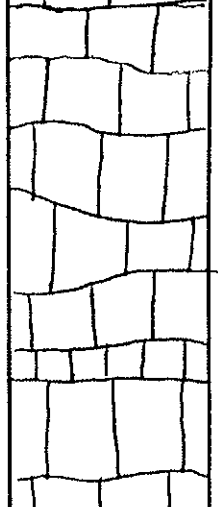


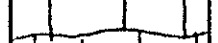
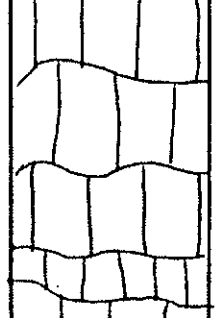

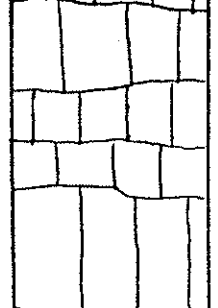


CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLARKANAS

GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS BINC. MICROSCOPE DATE 6/30/86




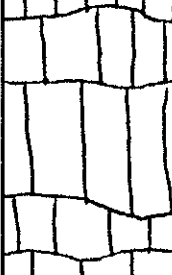

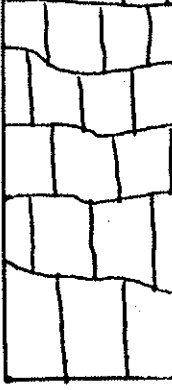
DEPTH INTERVAL	DESCRIPTION	
<u>1167'</u>	<u>Basalt (A/A)</u>	
		
	<u>1181'-1185'</u> - Three 5"-8" zones of heavy clay w/ brecciated rock	
	<u>1186'-1229'</u> - color: med lt gry - lt brnsh gry (to 1201')	
<u>1187'</u>	<u>1186'-1215'</u> - common fractures: vertical & sinuous, 45°	
		
	<u>1197'-1200'</u> - hairline incipient fractures, partly dissolved/etched, @ 60°	
<u>1207'</u>		

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLACKANAS

GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS ^{binoocular} microscope DATE 6/30/86

DEPTH INTERVAL	DESCRIPTION	
<u>1127'</u>	<p><u>VOLCANIC BRECCIA (A/A)</u> (cont'd) underlying basalt flow suggests deposition while partially molten.</p>	
	<p><u>1137.5'</u> Thin, irregular beds of ash-to lapilli-sz, commonly oxidized, rock fragments w/ subtle small scale cross bedding.</p>	
	<p><u>1138': BASALT</u> med-med dk gry to lt brnsh gry, porphyritic (~7%-12%) w/ phenos of plag, cpx, ol, w/ rare sieve textured mineral clots 3-15 mm diameter.</p>	
	<p><u>1147'</u> ol → iddingsite; ^{matrix} plag → clay, particularly near fractures. Lt orange & pinkish clay coating on most frac. surfaces. ± rare tourmaline, pyrochlore, earthy hematite</p>	
	<p><u>1139'-1142'</u> horizontal to 40° fracturing <u>1143'-1144'</u> vertical to 15° fracturing - v. fractured. heavier pinkish brn clay.</p>	
	<p><u>1149'-1152'</u> frac. predom 15° or less, secondary 40°-60° - horizontal</p>	
<u>1167'</u>		

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE 6/29/86

DEPTH INTERVAL	DESCRIPTION	
<u>1087'</u>	<p>DACITE (A/A @ 854') <u>1087'-1090'</u> fractures @ 45° to 6 ± sinuous vertical fracture, fewer ⊥ to 6</p>	
	<p><u>1101'-1103'</u> Vertical fractures with heavy clay (lt. brn) <u>1105'-1109'</u> Small microlitic voids appearing, irregular shapes, small increase in % pyx.</p>	
<u>1107'</u>	<p><u>1109'</u> Intense clay alteration, 6" inclusion (dark gray) reacting w/ dacite (being digested) <u>1110'</u> Contact: intense clay alteration but no signs of baking. Lt. gry. Appears brecciated & gradational w/ underlying unit, w/ pebbles & boulders of dacite in clay matrix, becoming heterolithic at base</p>	
<u>1112'</u>	<p>VOLCANIC BRECCIA (SURGE DEPOSIT?) Angular to sub-angular lapilli & block size basalt-basaltic andesite (many from underlying unit) & less commonly, silicic rock fragments. Clayey matrix (from ash?) of ash sz rock fragments & crystals.</p>	
<u>1127'</u>	<p><u>1114'</u> Small lapilli- to ash-size, rounded clay clasts are wht to tan & contain hornblende & biotite, suggestive of devitrified pumice. Discontinuous laminae & v. dark gry-brn gry, thin discontinuous beds w/ small lapilli-ash sz rock frags suggest <u>surge origin</u>. Oxidized slightly disrupted basaltic material near contact with</p>	

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTG H 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) McDANNEL/GODDWIN
BASIS binoc. microscope DATE 6/29/86

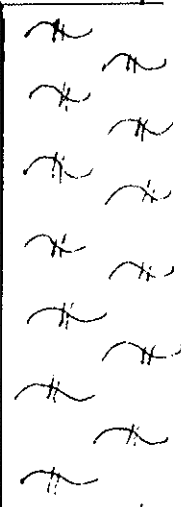
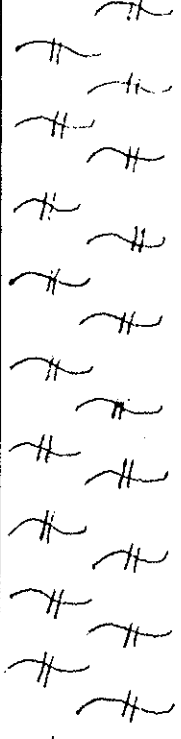
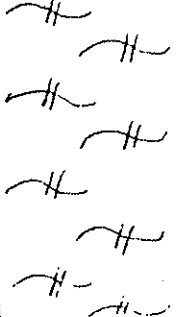
DEPTH INTERVAL	DESCRIPTION	
<u>1047'</u>	DACITE (A/A @ 854')	#
	<u>1047'</u> R specks black iron mineral (hematite?), v. fine, scattered through groundmass, rare larger hematite blebs	#
	<u>1049.5' - 1050'</u> intensely fractured	#
	<u>1052' - 1053'</u> heavy clay (med. brn color)	#
	<u>1057' - 1075'</u> - splintery, high angle fracture	#
		#
<u>1067'</u>	<u>1066' - 1081'</u> fracturing - moderate to intense, distinctive conjugate joint set @ 15° to 45° w/ splintery fracture locally lt. limonite to 1109'	#
		#
	<u>below 1075'</u> subtle increase in phenocryst %:	#
	① <u>1076'</u> 6-8% → 8-12% (locally) coexisting hematite (metallic)	#
	and FeOx (earthy) near fractures	#
		#
	<u>1081' - 1090'</u> fractures @ 45° to 45° ± sinuous vertical fracture >> fracture ⊥ to 45° (90°) darker color than upper part of unit	#
<u>1087'</u>	<u>1081' - 1083'</u> heavy clay, med. - lt. brn & grayish orange pink w/ R + pyrolusite associated	#

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CT6H-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) MCDANNEL / GOODWIN
BASIS brn. micro. DATE 6/28/86

DEPTH INTERVAL	DESCRIPTION	
<u>1007'</u>	<p>DACITE (A/A @ 854') <u>1010'</u> - 8-10" fractured zone w/ heavy pinkish tan clay.</p>	
<u>1027'</u>	<p><u>1020'-1022'</u> fractured interval (vertical fractures) heavy clay (pinkish) <u>1023'</u> green clay on surface w/ reniform texture * groundmass darkening, suggesting changing (i.e. more mafic) composition w/ depth, texture is more homogeneous & equigranular <u>1028'-1039'</u> fractured interval (vertical to sub-vertical & horizontal to 70° & to ♀) w/ heavy brn clay at base of interval</p>	
<u>1047'</u>	<p><u>1040'-1049'</u> Less fractured, less clay and alteration</p> <p><u>1047'</u> lt. coating of grn clay/faky min. on fracture</p>	



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS _____ DATE 10/28/86

DEPTH INTERVAL	DESCRIPTION
<u>967'</u>	<p>DACITE (A/A @ 854')</p> <p><u>967'</u> - minute aggregates of lt. grn-yel. to dr. ^{flaky} min. on frac. surfaces</p> <p><u>972'</u> - dr. flaky min. a/a ; minor cpx } oxidation & g. mass } (reddish)</p> <p><u>974'</u> - R. flaky min. & clays have decreased</p>
<u>987'</u>	<p><u>991'</u> - fracturing intensifies, 70°-90°</p> <p><u>1000'</u> - 6"-8" heavy clay (30%) & breccia</p> <p><u>1001'</u> - 2" " " " "</p>
<u>1007'</u>	



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) MCDANNEL/GOODWIN
BASIS BINOX. SCOPE DATE 6/27/86

DEPTH INTERVAL	DESCRIPTION	
<u>927'</u>	DACITE (A/A @ 854')	#
	<u>930'-931'</u> - intensely fractured	# #
	<u>934'-935.5'</u> " "	# #
	<u>937'-948'</u> - " "	# #
	<u>939'-939'</u> - breccia, angular to sub-angular rock fragments (1/2"-6") in matrix of lt. tan (consolidated) clay, sand size rock frags, xtls	# #
		# #
		# #
		# #
		# #
		# #
<u>947'</u>		# #
		# #
		# #
		# #
		# #
		# #
	<u>963'-965'</u> : brecciated zone, increase in clay	# #
		# #
	<u>960'</u> - slight change in rock texture. Appears less porphyritic, fewer (smaller) plag phenos.	# #
	Strongly resorbed hornblende xtls →	# #
<u>967'</u>	feldspar, cpx, opx	# #

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTBH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS BNZ. MICRO DATE 6/26/86

DEPTH INTERVAL	DESCRIPTION	
<u>887'</u>	DACITE (A/A)	#
		#
		#
		#
		#
		#
	<u>894'-899'</u> fractured + sheared. Heavy brn. clay (~10°)	#
		#
		#
		#
		#
		#
	<u>905'-906.5'</u> - intensely fractured	#
		#
<u>907'</u>		#
		#
		#
		#
		#
		#
		#
		#
		#
		#
		#
		#
	<u>917.5'-918.5'</u> - rubble, <1" ϕ fragments	#
		#
		#
<u>927'</u>		#
		#


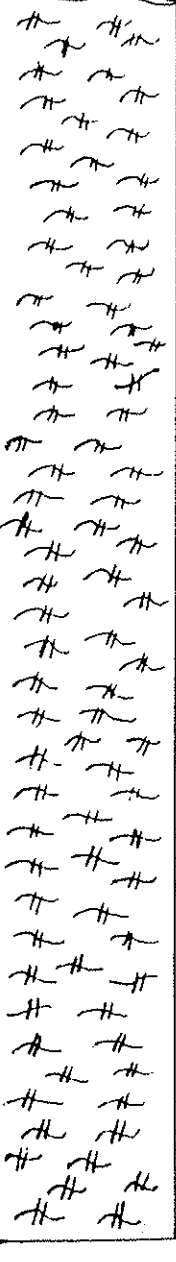


CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS BIND. SCOPE DATE 6/26/86

DEPTH INTERVAL	DESCRIPTION	
<p><u>847'</u></p>	<p>VOLCANIC BRECCIA (A/A) <u>844'-854'</u> contact w/underlying unit is marked by zone of boulders of underlying unit & less matrix than above. Transition may represent regolith & soil?</p> <p>854' DACITE Med grys, porphyritic. 4-10% phenocrysts of plg, cpx, opx. Slightly "glassy" appearance to fractures. Much of unit is intensely fractured w/ predominate direction 75°-80°; generally closely spaced (1-10cm) - producing platy fracture. Uncommon vertical fractures. Light brn, pinkish clay on fracture surfaces; FeO or MnO? on many fracture surfaces.</p>	
<p><u>867'</u></p> <p><u>887'</u></p>		

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1

GEOLOGIST(S) GOODWIN/MCDANIEL

FIELD CASCADES/CLACKANAS

BASIS BINOCULAR MICROSCOPE 6/25/86

DEPTH INTERVAL	DESCRIPTION	
<u>807'</u>	BASALTIC ANDESITE (AYA)	
	<p>809' VOLCANIC BRECCIA</p> <p>Sub-angular to sub-rounded lapilli & blocks of basaltic to silicic (less common) rock fragments in a yellowish brown matrix of ash, crystals & ash size rock fragments. Silicic fragments are more common near bottom of unit & appear to be same lithology as underlying unit (@ 854'). Crystals in matrix include biotite, feldspar, qtz, cpx, cpx, atz. Rock is matrix-supported & moderately to well indurated. Top 18 cm of unit is composed of dk grey ash & ash sz rock fragments. Unit has only minor fracturing & w/no preferred orientation. Minor lamprophyre stain.</p>	
<u>827'</u>	<p>826.5' matrix poorly consolidated - mainly mud & rock fragments collected from core barrel</p>	
	<p>839' - ~4 cm of fine laminations which contain v. small scale crossbeds.</p>	
<u>847'</u>		



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) McDANNEL/GOODWIN
BASIS BIN. MICROSCOPE DATE 6/25/86

DEPTH INTERVAL	DESCRIPTION	
<u>767'</u>	<p>BASALTIC ANDESITE (A/A) <u>770'-771'</u> increasing vesicularity <u>771'</u> FLOW BOUNDARY</p>	
	<p><u>771'-779'</u> rubble: brick red, vesicular, locally scoriaceous, ashy</p> <p>779': BASALTIC ANDESITE med. dk. gray, sparsely porphyritic (2-4%) phenos. < 2mm; plag., ol. vesicles 5-15%, decreasing with depth <u>779'-781'</u> subhorizontal stretching & concentration of vesicles in narrow bands</p>	
<u>787'</u>	<p>clays: tan, wht, pink in < 20% of vesicles and ptly. coating fractures</p>	
	<p><u>788.5'-792.5'</u> Rubbly</p>	
	<p><u>792.5'-795'</u> FLOW BOUNDARY: Rubbly med. dk. gry vesicular basaltic andesite and clayey-ashy flow breccia</p> <ul style="list-style-type: none"> - common med. brn clay filling interbreccia clast voids - tan & lt. brn clays fill fractures and ~10% of vesicles (i.e. 90% are void) <p><u>795'-800'</u> Rubbly, vesicular b.a.</p>	
	<p><u>800'</u> Common fractures, often @ 70% to 75% heavier clays, thick coatings on fracture surfaces. Lt. pink clay is the predominate clay.</p>	
<u>807'</u>		



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1

GEOLOGIST (S) GOODWIN / MCDANNEL

FIELD CASCADES / CLACKANAS

BASIS MICROSCOPE ID DATE 6/24/86

DEPTH INTERVAL	DESCRIPTION	
<u>727'</u>	BASALTIC ANDESITE A/A	
	<p><u>733'-739'</u>: SLIGHTLY SCORIACEOUS / ASHY LT. RED</p>	
<u>747'</u>	750': BASALTIC ANDESITE	
	<p>lt. med. gray (unusually lt.) to med. dk. gray, dense, massive, sparsely porphyritic to aphyric, gen'ly < 1% plag., ol., pyx., rarely fractured (1x/5' @ 30° to 45°) lt. brn clays coat fractures, < 1% vesicles</p>	
<u>767'</u>		

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADE/CLACKAMAS

GEOLOGIST(S) MCDANNEL/GOODWIN
BASIS MICROSCOPE ID DATE 6/24/86

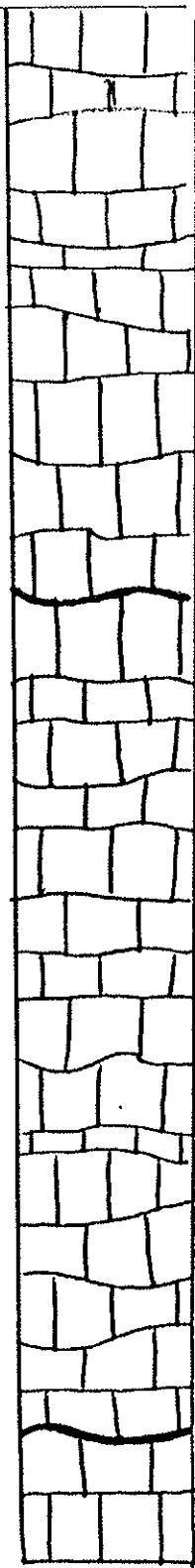
DEPTH INTERVAL	DESCRIPTION	
<u>687'</u>	<p><u>687'</u>: BASALT / BASALTIC ANDESITE (A/A) MED TO MED DK GRY, PORPHYRITIC (2-5% PHENOS) PHENOS \leq 2mm: PLAG, OL, PYX. OL \rightarrow IDdingsite fractures 0°-30°, locally vesicular pink, white, H. brn. clays on fracture surfaces & filling some vesicles</p> <p><u>693'-696'</u>: very fractured ^(A/A) & dense 5-10% vesicles (<1-30mm)</p>	
<u>707'</u>	<p><u>710'</u>: brick red, scoriaceous, flow breccia. APPROX. FLOW BOUNDARY ashly & poorly consolidated</p>	
<u>727'</u>	<p><u>719'</u>: BASALTIC ANDESITE med. dk grey, porphyritic (2-3%) phenos \leq 2mm: plag, cpx, ol. subtle red tint to groundmass light coating of clays on fracture surfaces</p> <p>fractures 0-30°, (intense fracturing 720'-738') less common horizontal</p>	

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADE/CLACKAMAS

GEOLOGIST(S) GOODWIN/MCDANNEL
BASIS MICROSCOPE ID DATE 6/23/86

DEPTH INTERVAL	DESCRIPTION	
<u>647'</u>	AS ABOVE (BASALT-BASALTIC ANDESITE)	
	<p><u>653'</u>: flow becomes denser, less vesicular fractures common - 0-25°, less commonly ~60° - producing 2"-4" pieces of rock</p>	
	<p><u>660'</u>: ash & conder zone FLOW BOUNDARY?</p>	
	<p><u>663'</u>: rock becomes better consolidated, vesicular zones of rubble persist to 684'</p>	
<u>667'</u>	<p><u>683-687'</u>: Well consolidated scoriaceous zone - flow breccia. Flow boundary.</p>	
<u>687'</u>		



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADE/CLACKAMAS

GEOLOGIST(S) McDANNEL/GOODWIN
BASIS BIN. MICROSCOPE DATE 6/23/86

DEPTH INTERVAL	DESCRIPTION	Diagram
607'	<p>607' BASALT/BASALTIC ANDESITE med. dk gray, finely porphyritic ~8% phenocrysts, ≤ 5 mm glomerocrysts of ol., plag., \pm R. pyx.? rubbly, w/ minor red scoria & ash until 606'. Large 606' - consolidated Vesicles 602-605. Pinkish clays fill vesicles</p>	
627'	<p>629'-634' vesicular interval 632'-639' fractured - predominately small (3") pieces. fractures are vertical to sub-vertical (15°). 2ndary set is horizontal to sub-horizontal</p> <p>646.5': flow boundary? Marked by ash/cinder/scoria zone (until 648)</p>	
647'		



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1

GEOLOGIST(S) MCDANNEL / GOODWIN

FIELD CASCADE / CLACKANAS

BASIS BIN. MICROSCOPE DATE 6/22/86

DEPTH INTERVAL	DESCRIPTION	
567'	AS ABOVE (rubbly, vesicular basalt/basaltic andesite w/clay & minor ash/sclera)	
	<u>579'</u> - approximate flow boundary	<hr/>
580'	BASALT/BASALTIC ANDESITE med gr, finely porphyritic ~8% phenos, ≤ 3mm. glomerocrysts of plag, ol, pyx	
587'	Fractures common: vertical to 10° & approximately horizontal & coincident with stretched/smearred/elongated vesicles Small vesicles pervasive & decrease w/depth Vesicles & fractures coated w/lt. yellow & pinkish clays	
607'	<u>604'</u> - approximate flow boundary vesicles pervasive and decrease with depth below oxidized, brick red horizon 1' thick marking rubbly contact	<hr/>



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CT6H-1
FIELD CASCADES/CLACKAMAS

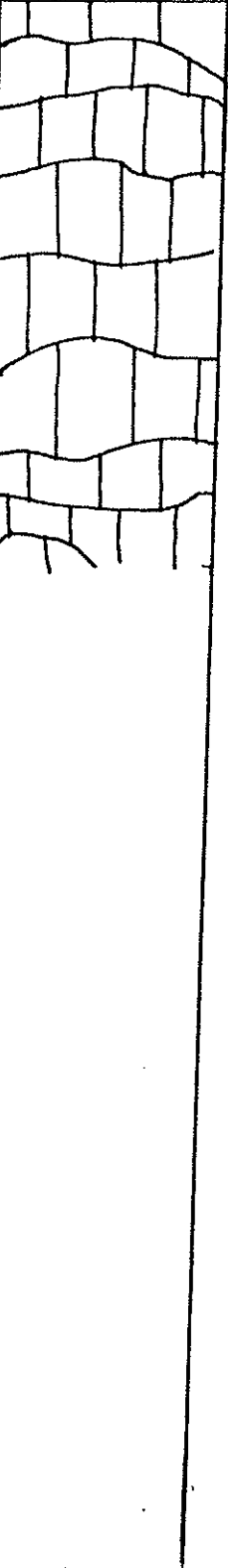
GEOLOGIST(S) GOODWIN/MCDANNEL
BASIS BIN. MICROSCOPE DATE June 22, 1986

DEPTH INTERVAL	DESCRIPTION	Lithology
527'	<p>527' BASALT/BASALTIC ANDESITE Med Lt gry to med gry, finely porphyritic ~10% phenos, all \leq 3mm: plag, ol, cpx glomerocrysts of plag, ol, \pm cpx</p> <p>Vertical to 25° fractures common, fracture surfaces have light to moderate coating of white to yellowish and pinkish clays.</p> <p>⊙ 540'-545', 548'-549': fracturing intensifies - core pieces 1"-5".</p>	
547'	<p>⊙ 549': oxidized to reddish-gry predominately rubble, w/well consolidated intervals. Becomes vesicular. Voids up to 3 cm</p> <p>⊙ 556': clay increases (lt. yellow + dk red)</p> <p>⊙ 560': ashy intervals</p>	
567'		

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) MCDANNEL/GOODWIN
BASIS BIN.MICROSCOPEID DATE 6/22/86

DEPTH INTERVAL	LITHOLOGIC DESCRIPTION	
	LITHOLOGY	
520'-527'		<p>BASALT / BASALTIC ANDESITE : MED. DL. GRAY to BRICK RED APHYRIC to SPARSELY PORPHYRITIC PHENOS : PLAG., OL, ± PYX.</p> <p>{ 520'-527' CONTAMINATED SAMPLE (RUBBER, CEMENT, METAL, SLOUGH, & LCMS = 75% of SAMPLE)</p> <p>ALTERATION: FeOx & MINOR CLAYS COAT VOIDS (PINKISH, ORANGE, WHITE)</p> <p>— END OF CUTTING DESCRIPTION — HOLE DESCRIPTION CONTINUES WITH PAGE 1 CORE DESCRIPTION (FORM 2)</p>



CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES / CLACKAMAS

GEOLOGIST(S) GOODWIN / McDANNEL
BASIS BIN. MICROSCOPE I.D. DATE 6/12/86

DEPTH INTERVAL	LITHOLOGY	LITHOLOGIC DESCRIPTION
480'-500'		<p>BASALT / BASALTIC ANDESITE! MED. DK GREY to BRICK RED APHYRIC TO SPARSELY PORPHYRITIC PHENOS: PLAG, OL, ± PYX</p> <p>{ 480'-490' - SLIGHTLY ^{Fe} MORE OXIDIZED THAN 490'-500' INTERVAL</p> <p>ALTERATION: FeOx $\frac{1}{2}$; MINOR CLAYS (PINKISH, ORANGE, WHT) ↳ COATS VOIDS</p>
500'-520'		<p>BASALT / BASALTIC ANDESITE: AS ABOVE</p> <p>{ 510'-517' - INCREASED FeOx</p> <p>ALTERATION: SAME AS ABOVE</p> <p>{ 517'-520' - CONTAMINATED SAMPLE (RUBBER, METAL, SLOUGH, LCMS)</p>

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) MCDANNEL/GOODWIN
BASIS BIN. MICROSCOPE I.D. DATE 6/12/86

DEPTH INTERVAL	LITHOLOGIC DESCRIPTION
440'-460'	<p>BASALT/BASALTIC ANDESITE; MED DK GREY TO BRICK RED FINELY PORPHYRITIC: PLAG & OL</p> <p>450-460' - PREDOM. ^{RED} OXIDIZED GROUNDMASS INCREASE IN PHENOCRYST CONTENT. (MAY BE ILLUSION DUE TO RED GM) FLOW BOUNDARY? PHENOS MAY APPEAR AS FREE CRYSTALS (<5%)</p> <p>ALTERATION: PERVASIVELY ^{Fe} OXIDIZED GROUNDMASS → MINOR CLAY, LIMONITE</p>
460'-480'	<p>BASALT/BASALTIC ANDESITE: $\left\{ \begin{array}{l} 460-470' \\ 50\% \text{ MED. DK. GREY} \\ 50\% \text{ BRICK RED} \end{array} \right.$ MED. DK GREY → BRICK RED</p> <p>APHYRIC ^{TO} SPARSELY PORPHYRITIC PLAG, OL MORE ^{MORE} VESICULAR THAN ABOVE → FLOW BOUNDARY? ^{& OXIDATION}</p> <p>ALTERATION: PERVASIVE FeO_x; LIMONITE, HEMATITE TR. WHIT, AMORPHOUS, SOFT MSSL (CLAY?)</p>

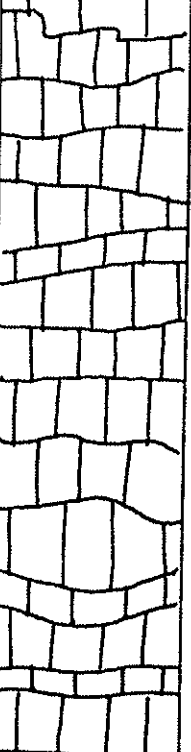
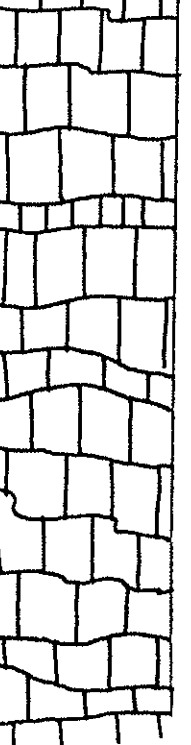
CUTTING DESCRIPTION

HOLE CTGH-1

FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) GOODWIN/MCDANNEL

BASIS BIN. MICROSCOPE ID. DATE 6/12/86

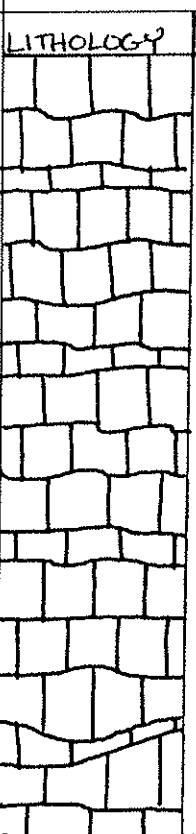
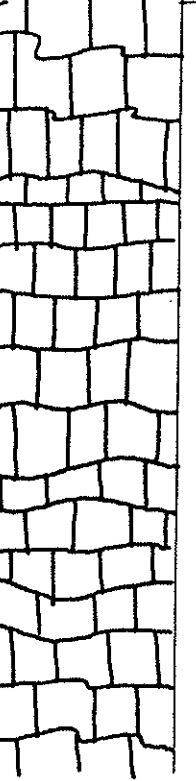
DEPTH INTERVAL	LITHOLOGIC DESCRIPTION	
400'-420'	<p>LITHOLOGY</p> 	<p>BASALT/BASALTIC ANDESITE: GRAYISH RED - APHYRIC - SPARSELY PORPHYRIC GRAYISH BRN PHENOS OF: PLAG & OL</p> <p>ALTERATION: PERVASIVE FeOX. MINOR HEMATITE & CLAYS. TR WHITE, SOFT, AMORPHOUS MAT'L (CLAY?) IN VEINLETS.</p>
420'-440'		<p>BASALT/BASALTIC ANDESITE: AS ABOVE MED. DK GREY - BROWNISH GREY</p> <p>ALTERATION: AS ABOVE, BUT LESS PERVASIVE</p>



CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

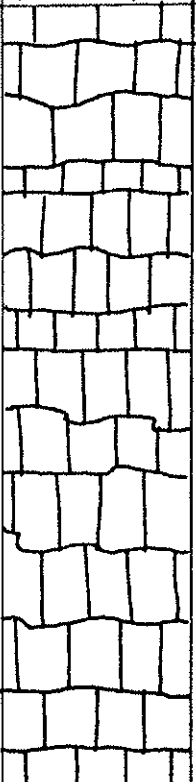
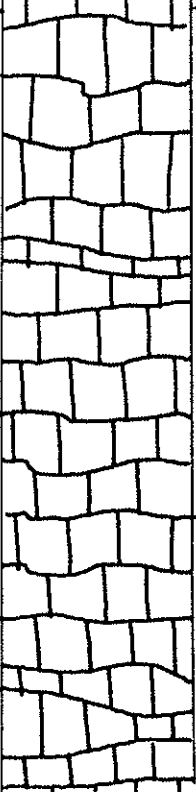
GEOLOGIST(S) GOODWIN/MCDANNEL
BASIS BIN. MICROSCOPE I.D. DATE 6/12/86

DEPTH INTERVAL	LITHOLOGIC DESCRIPTION	
360'-380'	<p>LITHOLOGY</p> 	<p>BASALT/BASALTIC ANDESITE:</p> <p>PREDOM. APHYRIC, LESS COMMON SPARSELY PORPH. BRN GRY - DARK GREY, DUSKY RED (~20%)</p> <p>PHENOS: PLAG, OL, BLACK PIX</p> <p>ALTERATION: 370'-400' WHITE MAT'L (CLAY?). HEMATITE & LIMONITE COMMON TR. SULFIDE(?)</p>
380'-400'		<p>BASALT/BASALTIC ANDESITE: (AS ABOVE)</p> <p>ALTERATION: AS ABOVE</p>

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) MCDANNEL/GOODWIN
BASIS BIND. MICROSCOPE I.D. DATE 6/86

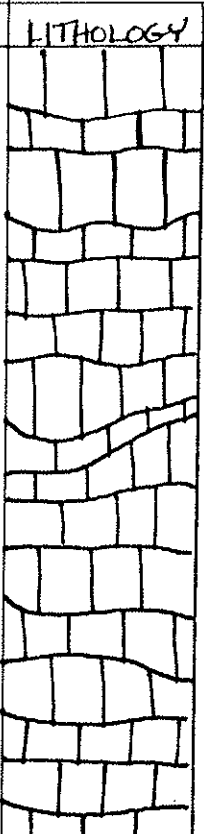
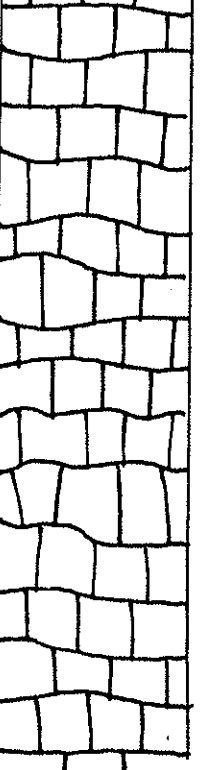
DEPTH INTERVAL	LITHOLOGIC DESCRIPTION	
	LITHOLOGY	
20' - 340'		<p>BASALT / BASALTIC ANDESITE :</p> <p>MED. GRY → DUSKY RED</p> <p>APHYRIC TO SPARSELY PORPHYRITIC</p> <p>PHENOS OF PLAG, OL, PIX (YELLOW CRX?)</p> <p>GLASSY, BLACK, FRAGS = CHILLED CONTACT/MARGIN</p> <p>ALTERATION: CONCENTRATED IN SCORIACEOUS FRAGS & VESICULAR FRAGS. COMMON EARTHY HEMATITE, LIMONITE, FeOx. TR. WHITE CLAY(?) IN SMALL VEINLETS</p>
40' - 360'		<p>BASALT / BASALTIC ANDESITE: (AS ABOVE)</p> <p>INCREASE TO 50% DUSKY RED COLOR</p> <p>ALTERATION: AS ABOVE, + WHITE, AMORPHOUS (CLAY?) MAT'L IN VESICLES</p>



CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) GOODWIN/MCDANNEL
BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	LITHOLOGIC DESCRIPTION	
280'-300'	<p>LITHOLOGY</p> 	<p>BASALT / BASALTIC ANDESITE: GREYISH BLACK TO BROWNISH GREY SPARSELY PORPHYRITIC - PHENOS OF PLAG + OL</p> <p>290'-300' - INCREASED VESICULARITY (CONTACT?)</p> <p>ALTERATION: MINOR CLAY(S) IN VESICLES ✓ RARE LIMONITE, FeOx METALLIC COATING ON CLAY (?) 280'-290'</p>
300'-320'		<p>BASALT / BASALTIC ANDESITE (AS ABOVE)</p> <p>+ MINOR BLACK, GLASSY FRAGS → CHILLED CONTACT/MARGIN</p> <p>ALTERATION: TR → COMMON WHITE CLAY(?) IN GROUNDMASS TR LIMONITE ON GLASSY FRAGS</p>

CUTTING DESCRIPTION

HOLE CTGH-1

GEOLOGIST(S) McDANNEL / GOODWIN

FIELD CASCADES / CLACKAMAS

BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1" = 5'	LITHOLOGIC DESCRIPTION
240'-260'	LITHOLOGY	<p>BASALT / BASALTIC ANDESITE: (AS ABOVE) APHYRIC TO SPARSELY PORPHYRIC. MED. DK GREY → MINOR RED { 250'-260' - BLACK GLASSY FRAGMENTS - CHILLED MARGINS?</p>
260'-280'		<p>BASALT / BASALTIC ANDESITE: (AS ABOVE) (w/ONLY MINOR DUSKY RED) { 260'-270' - PREDOMINATELY MICROPORPHYRIC SAMPLE { 270'-280' - FRESHER, LESS VESICULAR & LESS WEATHERED THAN PREVIOUS 20'</p>

ALTERATION: MINOR FeOx, CLAYS IN SMALL VESICLES

ALTERATION: MINOR FeOx



CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) GOODWIN/MCDANNEL
BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1" = 5'	LITHOLOGIC DESCRIPTION
200'-220'		<p>BASALT/BASALTIC ANDESITE: (AS ABOVE) APHYRIC TO SPARSELY PORPHYRITIC MEDIUM DK GREY → DUSKY RED</p> <p>200'-210' { ≤ 1% RESORBING OLIVINE, ± 2% PLAG PHENOS, 210'-220' { TR BROWN PYX BLACK, GLASSY FRAGMENTS = CHILLED FLOW MARGIN/TOP</p> <p>ALTERATION: MNR. HEMATITE MNR BROWN & WHITE CLAY IN VOIDS, (FILLING & COATING) WEATHERING</p>
220'-240'		<p>BASALT/BASALTIC ANDESITE: AS ABOVE</p> <p>ALTERATION: INCREASED FeOx (WEATHERING)</p>



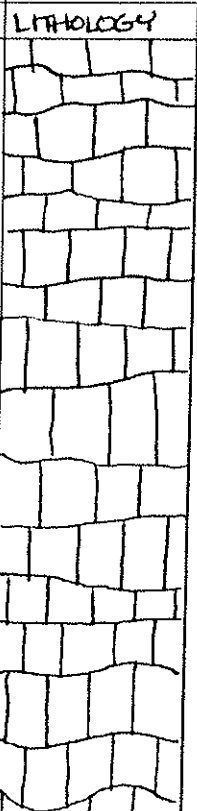
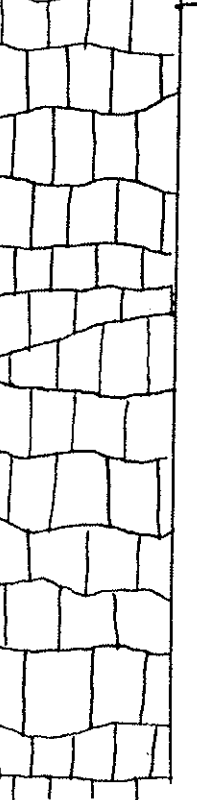
CUTTING DESCRIPTION

HOLE CTGH-1

GEOLOGIST(S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKANAS

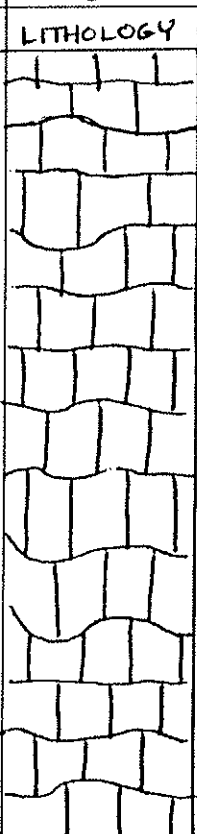
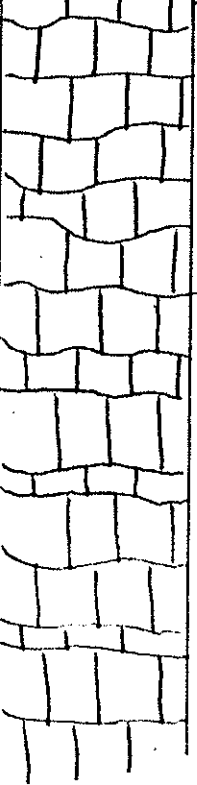
BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1" = 5'	LITHOLOGIC DESCRIPTION
160'-180'		<p>BASALT / BASALTIC ANDESITE: AS ABOVE DARK GREY → REDDISH BROWN</p> <p>{ 170'-180': RARE BLACK PYX PHENOS, OL</p> <p>ALTERATION: (MODERATE) LIMONITE, PINKISH CLAY IN VUGS</p>
180'-200'		<p>BASALT / BASALTIC ANDESITE: AS ABOVE</p> <p>{ 190'-200': ≤15% FRAGMENTS OF BLACK, GLASSY ROCK = CHILLED FLOW MARGIN?</p> <p>ALTERATION: AS ABOVE</p>

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKANAS

GEOLOGIST(S) MCDANNEL/GOODWIN
BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1" = 5'	LITHOLOGIC DESCRIPTION
120'-140'		<p>BASALT/BASALTIC ANDESITE: MED. GREY - DUSKY RED APHYRIC TO SPARSELY PORPHYRITIC (CPX) ROCK IS DENSE & UNALTERED</p>
140'-160'		<p>BASALT/BASALTIC ANDESITE: AS ABOVE { 140'-150' w/ RESORBING PLAG, OL</p> <p>ALTERATION: TR. HEMATITE, CLAY, DISSEMINATED 140'-150' TR. SULFIDES(?)</p>



CUTTING DESCRIPTION

WELL NO. CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST(S) GOODWIN/MCDANNEL
BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1" = 5'	LITHOLOGIC DESCRIPTION
80'-100'		<p>BASALT / BASALTIC ANDESITE : MEDIUM GREY TO LT. MED. GRAY & MED. REDDISH BRN. APHYRIC TO SPARSELY PORPHYRIC</p> <p>⑧ 80'-90': APHYRIC BASALT, 80% WEATHERED TO BROWN CLAYS, HEMATITIC ALTERATION <small>BASALTIC ANDESITE</small></p> <p>⑨ 90'-100': 30% RED, OXIDIZED (WEATHERED?), VESICULAR BASALT/BASALTIC ANDESITE; 40% LT. MED. GRAY MICROPORPHYRIC BASALT/BASALTIC ANDESITE W/RESORBED OL PHENOS; 30% BLACK, APHYRIC BASALT/BASALTIC ANDESITE</p> <p>ALTERATION: WEATHERING, FeOx, MNR BRN-RED CLAY</p>
100'-120'		<p>BASALT / BASALTIC ANDESITE: SPARSE APHYRIC TO SPARSELY PORPHYRIC MED GREY TO DARK GREY, MINOR REDDISH GREY</p> <p>⑩ 100'-110': 70% LT. RED BRN + RED DUE TO WEATHERING & OXIDATION, 30% BLACK, DENSE; VESICULAR</p> <p>⑪ 110'-120': 60% OXIDIZED & VESICULAR, 40% DARK GREY & DENSE</p> <p>ALTERATION: <small>MINOR</small> FeOx & BROWN CLAY, MINOR WHITE CLAY IN VESICLES</p>

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

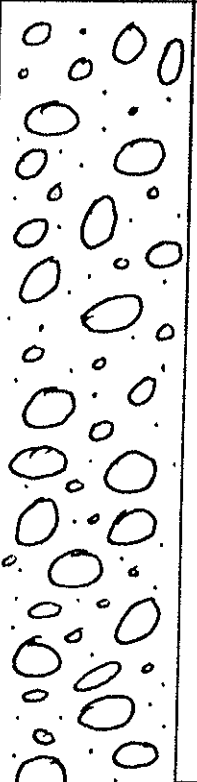
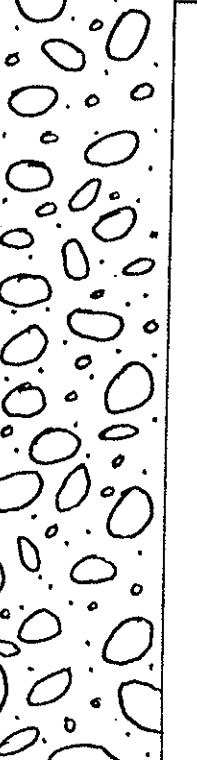
GEOLOGIST(S) MCDANNEL/GOODWIN
BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1" = 5'	LITHOLOGIC DESCRIPTION
	LITHOLOGY	
40'-60'		<p>BASALT/BASALTIC ANDESITE: APHYRIC TO SPARSELY PORPHYRIC MED. GRAY TO LT. MED. GRAY, MINOR REDDISH BRN. PHENOS TYPICALLY MICROSCOPIC: PLAG, OL, CPX, { 50'-60' 75% OF INTERVAL IS LINDERY (FLOW BOUNDARY?)</p> <p>ALTERATION: MINOR BROWN CLAY, FeOx, MINOR WHT CLAY (PLAG → CLAY)</p>
60'-80'		<p>BASALT/BASALTIC ANDESITE: AS ABOVE</p> <p>{ 70'-80' - 50% SMALL VESICLES</p> <p>ALTERATION: AS ABOVE + HEMATITE (FeOx) (COMMON)</p>

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES / CLACKAMAS

GEOLOGIST (S) GOODWIN / MCDANNEL
BASIS BIN. MICROSCOPE ID DATE 6/86

DEPTH INTERVAL	1" = 5'	LITHOLOGIC DESCRIPTION
	LITHOLOGY	
0-20'		<p>Qal: BOULDERS & COBBLES OF BASALT (GLACIAL TILL) MED. GRAY → MD. LT. GRAY, MINOR REDDISH OXIDATION SPARSELY PORPHYRITIC TO APHYRIC. (PHENOS: PLAG, PYX, OL)</p> <p>ALTERATION: WEATHERING & SURFICIAL OXIDATION</p>
20'-40'		As Above

