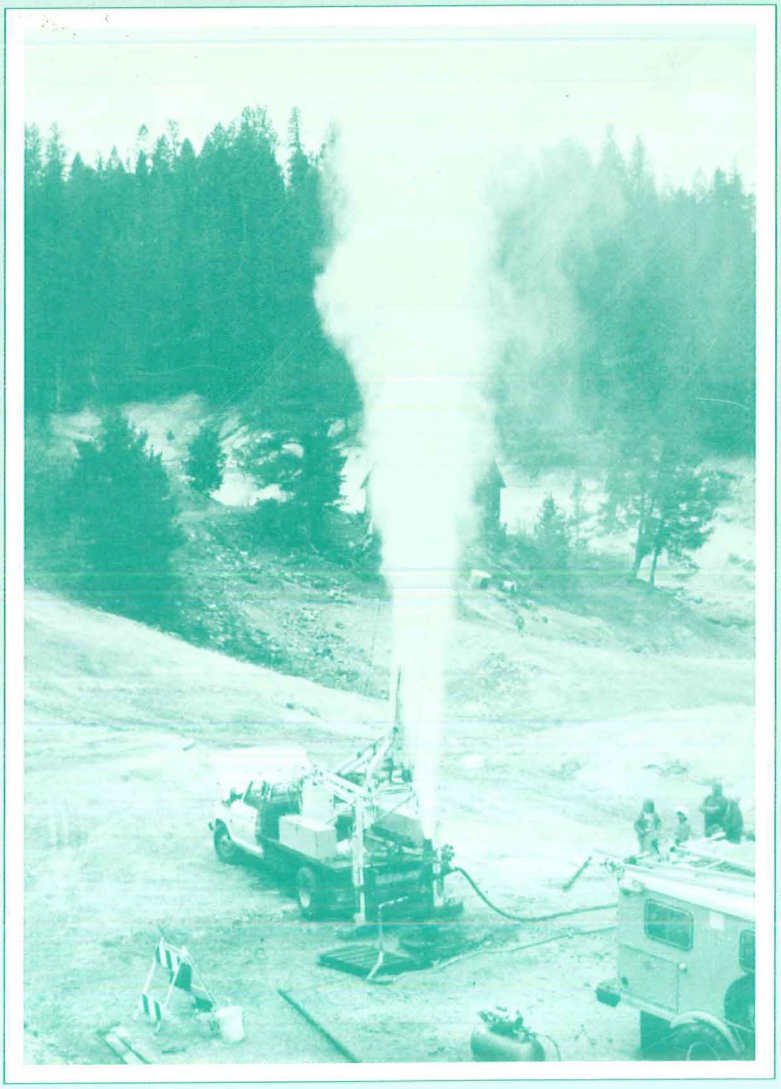
LA-11176-OBES

Core Log
Valles Caldera #2A,
New Mexico



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Core Log Valles Caldera #2A, New Mexico

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Los Alamos,New Mexico 87545

CORE LOG

VALLES CALDERA #2A, NEW MEXICO

by

Virginia L. Starquist

ABSTRACT

Scientific core hole VC-2A was drilled into the western ring-fracture zone at Sulphur Springs in the Valles caldera, New Mexico. VC-2A, the second scientific core hole in the caldera, was cored through a faulted and brecciated sequence of intracauldron tuffs and volcaniclastic rocks to a depth of 528 m. As of November 1, 1986, the unequilibrated bottom-hole temperature was 212°C. The rocks penetrated are intensely altered and host sub-ore grade stockwork molybdenite mineralization between 25 and 125 m. This report contains a detailed core log to aid researchers in their studies of the Valles caldera magma hydrothermal system.

I. INTRODUCTION

Valles caldera #2A (VC-2A) is the second scientific core hole drilled into the Valles caldera as a part of the Continental Scientific Drilling Program (Fig. 1). The primary objective of VC-2A was to penetrate the vapor zone beneath the acid-sulfate hot spring system of Sulphur Springs on the western edge of the resurgent dome inside the caldera (Goff and Nielson 1986). Secondary objectives were to core through the interface between the vapor zone and the hot water-dominated zone, to obtain structural and stratigraphic data

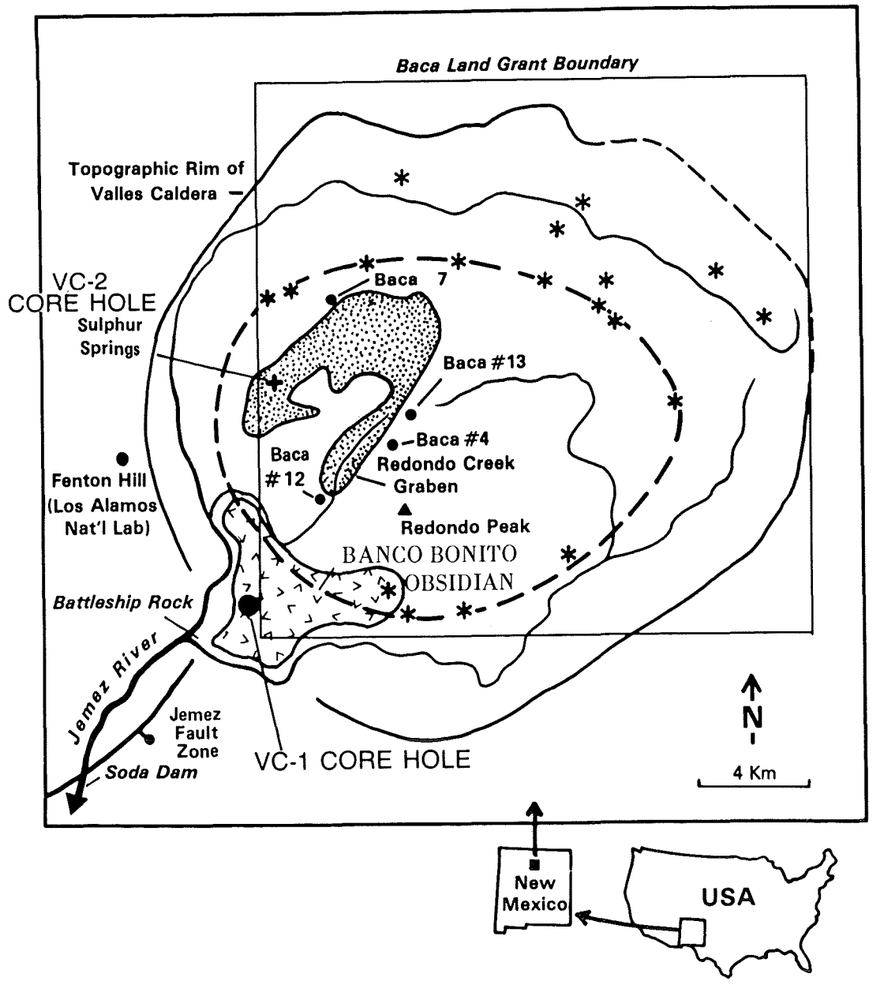


Fig. 1.
Schematic map of Valles caldera region showing location of VC-2A.

on the caldera fill rocks along the ring-fracture resurgent-dome boundary, and to determine possible mechanisms of ore deposition in an active caldera hydrothermal system.

Over 98% of HQ core (62-mm diameter) throughout the entire length of the bore was successfully recovered. The core hole was spudded on September 5, 1986, and completed in 24 days. Total depth is 527.7 m (1731 ft) and the unequilibrated bottom-hole temperature (BHT) was 212°C (410°F) as of November 1, 1986. The core from 366 core runs averaging 5 ft in length is stored in 224 boxes.

A core log in the Appendix provides detailed information on rock types, coherency, mineralization, alteration, and rock structures observed in the core. It is intended to be used by researchers who wish to work on research projects associated with the Valles caldera scientific drilling program or other research problems. All core was cleaned, labeled, and boxed according to the sampling procedures of S. Goff (1986). Those who wish to obtain core should contact Fraser Goff or Jamie Gardner, ESS-1, D462, Los Alamos National Laboratory, Los Alamos, NM 87545 or Dennis Nielson or Jeff Hulen, University of Utah Research Institute, 391 Chipeta Way, Suite C, Salt Lake City, UT 84108. After the summer of 1987, all core will be stored at the US Department of Energy Core Repository in Grand Junction, Colorado. The curator of this repository is Richard Dayvault.

II. DISCUSSION

For description of the core in VC-2A, a two-facing-page log was utilized (see Appendix). The first page contains a heading with general information, drilling dates, depth, and number of boxes and runs. Lithology was graphically logged at a scale of 3/4 in. = 5 ft, there being 50 ft (15.25 m) per page. A coherency profile shows the competency of the rock, and separate columns show specific mineralization. The second page of the set has similar headings and a number of columns for noting core recovery (in feet per run), the run number, and descriptions of structures including sketches of fractures and broken zones, the angle of dip of fractures and infillings, fracture frequency (number of fractures per run), and relative porosity. Sections of core were waxed at selected intervals and are indicated with a special symbol ( ) and a sample number with the corresponding depth, i.e., W#19-1, 61-61.9'.

A summary section of VC-2A is shown in Fig. 2. At the top of the core hole, the first rocks encountered were landslide debris and volcaniclastic sediments. The greater portion, however, consists of various ash-flow tuffs, with lesser intervals of air-fall tuffs and tuff breccias. Also encountered were thin intervals of sandstone and cataclastic rocks.

Most of the rocks are hydrothermally altered. In much of the tuff sequence the lithic fragments and fiamme are altered to pale green clay. From 435 m (1428 ft) to total depth, the matrix is also composed of green clay giving a distinctive green turquoise color to the rock. These clays have been analyzed by x-ray diffraction and consist of sericite-montmorillonite-illite with or without chlorite. In many instances the plagioclase in the rock is altered to soft clay, and the rock consequently appears to be pitted. In the upper part of the hole there are intervals of "splotchy" appearance that are due to a hydrothermal alteration overprint on devitrified welded tuff.

A number of interesting structures were observed in the tuffs. Most conspicuous are a number of breccias; small vein breccias, fault breccias, and coarse-grained tuff breccias. At 487 m (1596 ft) there is a possible intrusion breccia displaying angular lithic fragments in a matrix of calcite and green clay. This zone has a flaring cylindrical shape, 65-70° from core vertical, but is only a few centimeters in length. At 477 m (1565 ft) there appear to be welded pumice trains in very fine grained tuff. Mylonites are observed at several locations in the vicinity of 479 m (1570 ft). A spectacular section of bedded, fall-out tuffs occurs from 373 to 380 m (1225 to 1248 ft).

Alteration minerals were observed with the binocular microscope. Pyrite is always present, from 1 to 10%, and usually noticed as striated cubes, 1-2 mm in size. The next most common mineral is calcite, seldom disseminated, but rather in slender veins, these often with chloritic selvages. Molybdenite occurs as black coatings, not with the usual coarsely crystalline blue aspect, and is associated with Mn, Zn, Pb, and Cu. It is fairly common along fractures in the region of the hole between 25 and 125 m (Hulen et al. 1987). Amorphous hematite appears rarely as small patches of red stain. There is one notable occurrence of green fluorite in 2-cm octahedrons in a vein breccia at 165 m (540 ft). Very small crystals of rutile occur at 516 m (1694 ft). The rutile is associated with a druse of calcite crystals, and a zinc sulphide, probably sphalerite. Rhodochrosite was logged at 167 m (550 ft).

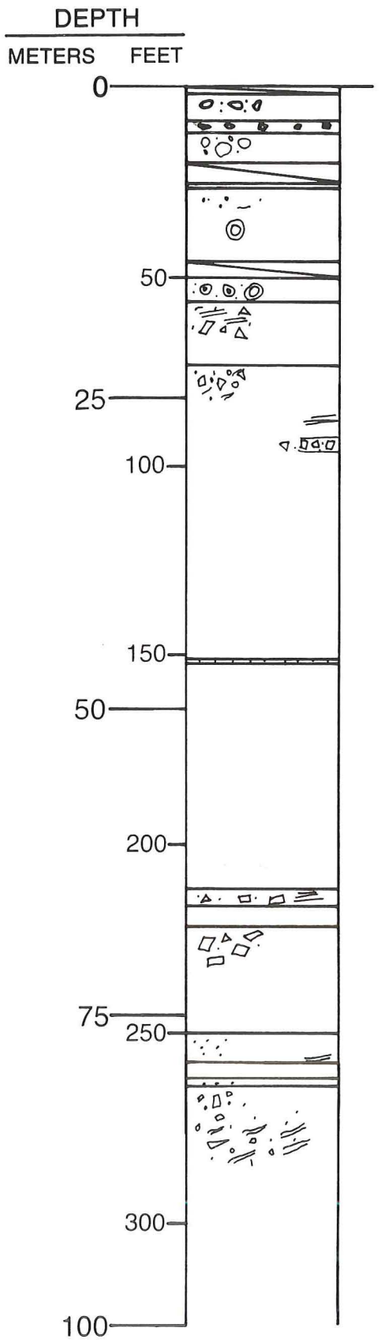
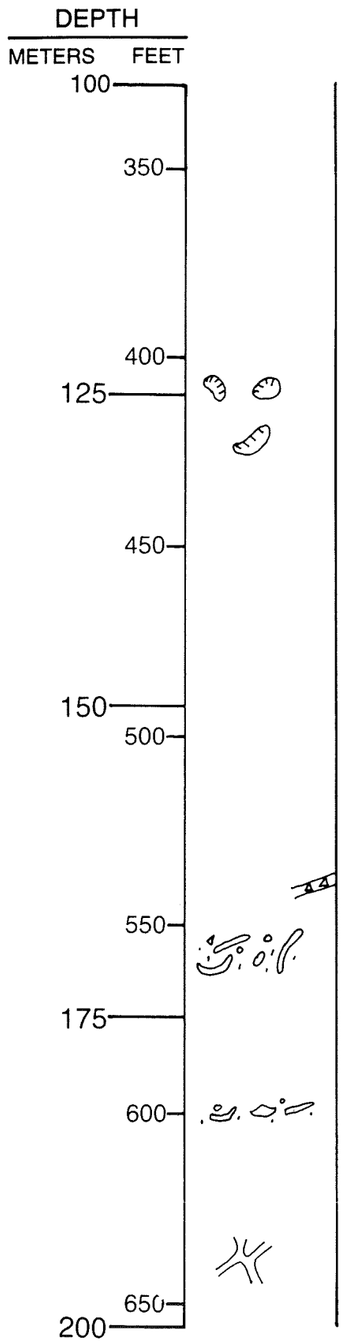


Fig. 2.
Summary section of VC-2A.



patchy devitrification in tuff

vugs conspicuous at 401′-491′ are filled with clay and/or pyrite and quartz crystals

bleached and devitrified tuff

smaller vugs 530′-552′ ±

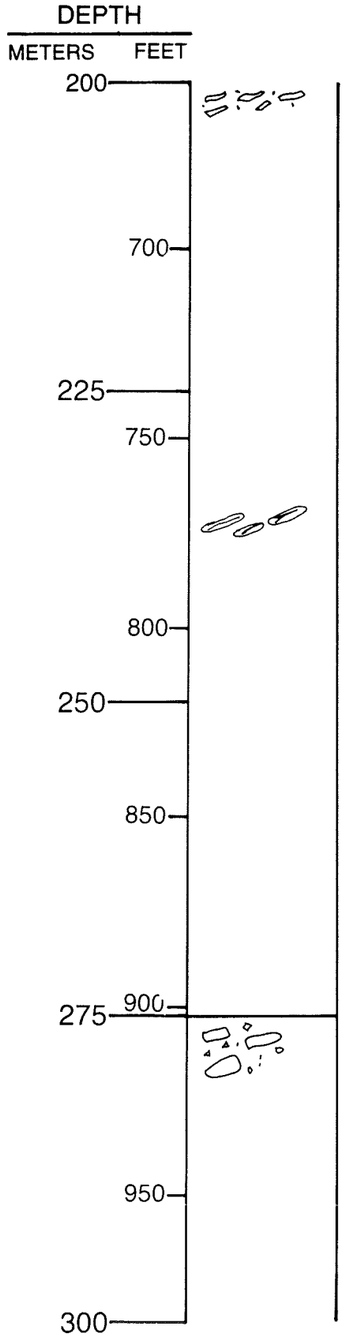
Vein breccia with fluorite crystals, 540′

Conspicuous green clay in veins and pods, and as vug filling

green fiamme in tuff

calcite veins with chloritic selvages in tuff

Fig. 2. (cont)



abundant fiamme, distinct flow orientation in tuff

gray-white tuff, with green clay on fractures, and green sericitic alteration of fragments, fiamme, & phenocrysts

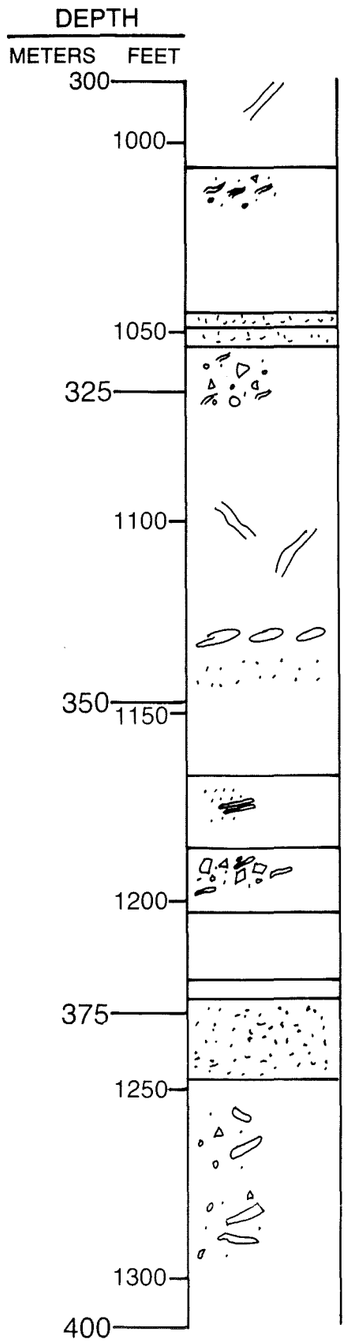
tan/light brown tuff
green fragments & fiamme

ivory tuff, green fiamme

crystal rich, light brown tuff

Poorly welded ash-flow tuff 903′-1007.5′
gray-brown, fewer fragments, crystal rich, very little green alteration

Fig. 2. (cont)



calcite veins with chloritic selvages

Densely welded tuff 1007.5′-1046′ ±
dark gray, fragmental, swirly fabric
very little green alteration

Air-fall tuff 1049.2′-1054′ ±

Fragmental tuff 1054′ ±-1167.5′
gray, crystal rich; fiamme

conspicuous calcite veins with chloritic selvages 1095′-1152′

green fiamme & fragments in tuff
pitted tuff

Sandy tuff/tuffaceous sandstone 1167.5′ ±-1186.3′
with bedding

Fragmental tuff 1186.3′-1203′ ±
densely welded, lt.tan with green fiamme

Partially welded tuff 1203′ ±-1221′
pitted, bleached, fragmental; inconspicous. fiamme

Densely welded tuff (?) 1221′-1225.5′

Fall-out tuffs 1225.5′-1248′

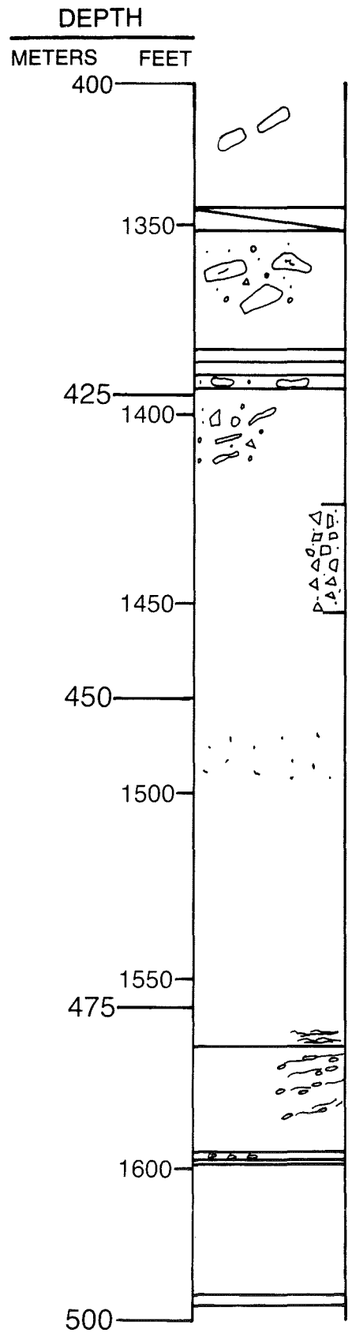
Moderately welded tuffs 1248′-1382.5′
to nonwelded tuffs

grey, pitted tuff

random fragments in tuff

inconspicuous pumice in tuff

Fig. 2. (cont)



pits and vugs in tuff
poorly welded, crystal rich tuff

increase in lithic fragments in tuff
large, noncompressed pumice fragments in tuff

Densely welded tuff 1382.5′-1386′; "feathered" pumice
Moderately welded tuff 1386′-1390′
Nonwelded tuff 1390′-1393′

Densely welded tuff 1393-1568′
crystal rich, fragmental tuff

? Tuff breccia 1423′-1452′
(Lag Breccia?) "TERRAZZO" aspect

green altered matrix 1428′-1731′ T.D.

pitted tuff

?welded pumice trains 1565.5′,1567.5′

Nonwelded tuff 1568′-1596′
No quartz
Mylonites 1570′-1585′

? Cataclastic tuff/intrusion breccia? 1596′-1596.4′
Welded tuff 1597.7′-1633′
Quartz to 1610′ ±
No quartz 1610′ ±-1636′ ±
Mylonite 1630′
Nonwelded tuff 1633′-1636′; no quartz

Fig. 2. (cont)

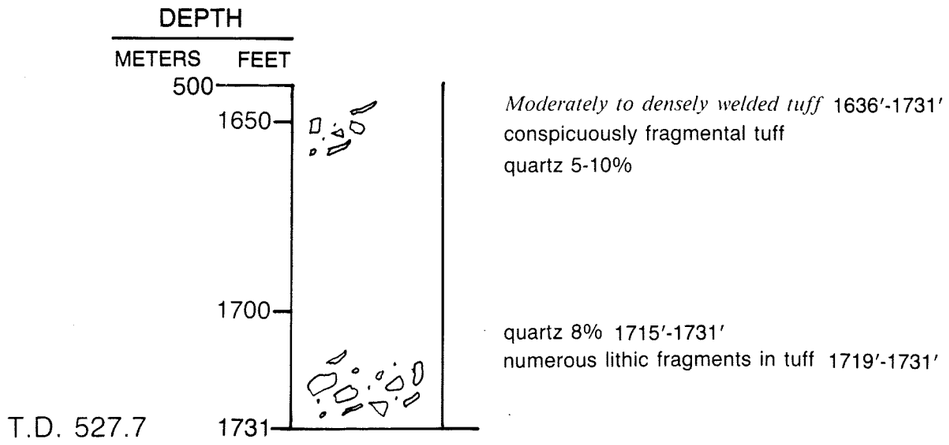


Fig. 2. (cont)

Mineralization on fractures consists mainly of potassium clays and calcite, sericite clays with or without chlorite, pyrite and pyrite mud, and ore minerals such as the molybdenite. A general observation can be made that low-angle fractures (0-30°) tend to exhibit clean surfaces, whereas the higher-angle fractures are the ones with the vein infillings mentioned above.

ACKNOWLEDGMENTS

The author wishes to thank Greg Bayhurst of INC Division for x-ray diffraction analyses and Robert Baran of ESS Division for field and laboratory assistance.

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Goff, S. "Curatorial Policy Guidelines and Procedures for the Continental Scientific Drilling Progam," Los Alamos National Laboratory report LA-10542-OBES (January 1986).

Hulen, J. B., F. Goff, D. L. Nielson, J. N. Gardner, and R. W. Charles, 1987. "Molybdenum Mineralization in an Active Geothermal System, Valles Caldera, New Mexico," Geology (in press).

APPENDIX

VC-2A CORE LOG

Lithologic Log

Page 1 of 36

DRILL HOLE VC-2A ATTITUDE -90° AZIMUTH ____ C. ELEVATION ____ TD 1731

LAT. ____ LONG. ____

DATE: START 9/5/86 COMPL. 9/26/86

LOGGED BY VLS DATE 9/10-10/29/86

BOX(ES) 1-5 RUN(S) 2-15

DESCRIPTION	DEPTH	ROCK TYPE	PICTURE: COHERENCY PROFILE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER	dacite
		X									
Landslide debris 2-20'± (bott. indef.)				.		?					
Tuff w rhyolite fragments	5										
Rhyolite, ? Tuffisite				.							
XL rich tuff, and various unrecognizables											
hydrothermally altered	10										
9-12' gray-brown, clayey rhyolite p. Conspicuous altrd. clayey plag.				.							
clayey bx	15										
clay gouge				.							
lg tuff	20										
	25	X									
Volcaniclastic sediments 26-57 (top indet.)		0									
Irr + cut bedding, lenses	30										
Random fragments											
Accretionary lapilli										?	
altered											
Py cubes 1-5%	35										
	40	X									
	45									?	
	50	X									

HOLE NO. VC-2A PROJECT CSDP PAGE 1 OF 36

ATTITUDE -90° LOCATION SULPHUR SPRINGS LOGGED BY VLS

LONGITUDE ____ DOWN HOLE SURVEY DATE 9/10-10/29/86

ELEVATION ____

DEPTH	DECLINATION	AZIMUTH

INCLINATION -90° WATER FIRST MET ____

TOTAL DEPTH 1731'

CORE SIZE Hq

COMMENTS	DEPTH	CORE RECOVERY	RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	HYDROLOGY: Drillers Comments Mud Tank	Waters. Gases
		0.0									
		1.0'	2	comp. w softer zones	X			7	lo		
	5										
		4.0'	3	clayey	X	50° 30° 80-30-10°	clay brown clay	20	med→hi		
	10				X						
		5.0'	4	but core shape comp. hard clay + crumbles		70, 10 50	"	8	"		
	15				X	50 30	brown mud	10+			
		4.0'	5	soft, core shape clay, crumbles		60 45 50	clean clay "	7 10	hi		
FIXED #5.7, 18.4-18.9	20				X						
	25	0.0	6								
		3.0'	7	sand, clay, crumbles		10 30	clay to mud	10+	low med.		
		4.0'	8			30-50	clay				
	30			soft		60	clay	10+			
		5.0'	9	med. hard		60→70	clay brown clay pebble to clay	11			
	35					20 10					
		0.0	10		X						
		2.0'	11					10+			
	40										
W #12-1, 41-41.7		LOST 3.0				40	to clay	10+			
		0.7	12 LOST 0.9	soft							
		2.4	13		X	0 50 30, 40	clay "	8	low		
	45										
		1.8	14	mod. soft, core shape				2	to med.		
		LOST 0.9									
		0	15								
	50										

Lithologic Log

Page 2 of 36

DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 5-12 RUN(S) 15-28

DESCRIPTION	DEPTH	ROCK TYPE	PICTURE: COHERENCY PROFILE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER	? specularite
Sediments continue vic. 51' conspicuous, distinctive accretionary lapilli	55			·					?		
Patches of phyllic alteration: Si/ser/py				·							
57-73 fault zone; clay + crumbles, clay gouge, bx tuff matrix, K-stained fragments.	60			·							
Cg conglomerate/agglomerate? Ltl. frags. to 3", Llas + sub-Llas Heavily pyritic	65			·							
? rhyolite fragments	70			·							
72'± - (Top in dot) ? Bandelier Tuff	75			·							
Llas → sub Llas lithic frags. Bleached Biot, 1 cube py, py after biot, ? py after fragments	80			·							
Bleached white clayey matrix @ 82' little more competent, vuggy No flow	85			·							
Itz, biot, + lithic pebbles 1mm → 1½" Cavities @ 88' fault g., broken w clay on fractures	90			·							
92-96 cg bx: one 8" frag. pyritized frags. Bleached tuff matrix py to 10%	95			·							
Tuff, hard dot, silic, py 2-5% Standley weld dot Distinctive fract. coatings of py/py mud/ser/? specularite	100			·							

16 #1

NOTE: all "specularite" in this log has been determined to be MoS_2 w Cu + Pb

Fracture coatings @ sample #1 = quartz + potassium clay + molybdenite + pyrite

HOLE NO. VC-2A PROJECT ____ PAGE 2 OF 36

ATITUDE ____ LOCATION ____ LOGGED BY VLS

NGITUDE ____

ELEVATION ____

INCLINATION ____

TOTAL DEPTH ____

CORE SIZE HQ

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

DATE 9/10-

WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters, Gases
		0	15	soft, whole							
		4.0	16	broken, clayey	X	70, 30, 10	clay	10+	hi med.		
	55	2.5	17	whole mod. hard.	X	30 60	clean lt. clay	5			
		lost 2.5		mod. soft to broken + clayey		80	clay	10+			
	60	5	18			60, 20	"		lo med		
W #19-1, 61-61.9'		E=+1'				70	"				
	65	0.9	19	all recovered is wafer							
		lost 4.1'									
		2.0 E=1'	20	bf w clay matrix		20	"	10+	lo		
	70	0	21								
		5.3	22	clay, crumbly bx		30 10	"	10+	lo, med + hi (bx) lo		
	75										
		0.6	23	med. soft/ whole				2			
W #24-3, 79.5-79.9±	80	lost 4.4' 5.3	24	soft → crumbles		50, 80	"	10+	hi		
		5.3	25	med. hard w zones of clay + crumbles		70	lt py mud	10+	med → lo hi (vuggy)		
	85										
		lost 0.3				70° sealed	clay, py mud w sericite				
		5.3	26	"		30	clay	10+	med		
	90					50, 80	lt clay		hi		
		lost 0.1				30	lt py m.		med		
		5.3	27	"		80, 60, 70		10+	lo		
	95					20	clean				
		lost 0.3				50 → 80	py mud + ? specularite		med		
W #28-5, 97-97.8±				hard/				10+			
	100	5.3	28	broken		70, 89	ser. clay w py + ? spec.		hi & lo		

17

Lithologic Log

DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____
LAT. ____ LONG. ____
DATE: START ____ COMPL. ____
LOGGED BY ____ DATE ____
BOX(ES) 12-18 RUN(S) 28-38

DESCRIPTION	DEPTH	ROCK TYPE	PICTURE / COHERENCY PROFILE	MINERALIZATION AND ALT. PRODUCTS (PYRITE, QUARTZ, CALCITE, FLUORITE, GYPSUM, MAG/HEM, OTHER specularite?)
fragmental welded tuff	105			
	110			
py and/or specularite to 5%	115			
subhed. qtz + broken XLS XL lined vugs along fracts. Hairline fracts approaching honeycomb	120			
modest flow structure around qtz grains small scale vn bx	125			
sericite in matrix #2 - Qtz, Ca, K clay. Some Ca w. hi Mn numerous sealed fractures	130			
vein bx	135			
vugs vic. 139' sealed bx w. lg frags. (2-3")	140			
Qtz XLS line fract. (vuggy surface) vug along fract	145			
py 3%	150			

HOLE NO. VC-2A PROJECT ____ PAGE 3 OF 36
LATITUDE ____ LOCATION ____ LOGGED BY ____
LONGITUDE ____ DATE ____
ELEVATION ____
INCLINATION ____
TOTAL DEPTH ____ WATER FIRST MET ____
CORE SIZE Hq

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	RUN	Weathering Alteration	Faults/ Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	Drillers Comments Mud Tank	Waters. Gases
	105	5.3 lost 0.1' 5.3	28 29	broken Comp.	X X	85 50 50, 80 80, 90, 60	py/spec./ ser. mud. rare tr hem. "	10	lo rare vugs		
	110	5.0	30	Comp.		25 70-90 50-60	"	12	lo		
	115	4.0	31	Comp.	X	80, 30 15-20-30	" same, in lesser amts.	13	"		
	120	5.0	32	Comp.		80 10 20 5 30	white ser, clay w py + spec. py/spec. minor ser, clay drusy qtz	7	"		
W #32-11, 120-120.5' ±	125	5.0	33	Comp.	X	40 10-20 10, 60	XLS in vugs + fracts. " drusy qtz blotches of	11	lo → v. lo		
	130	5.0	34	"		10 20, 10 60 30, 40 40, 10	py/spec. spec/py/ qtz ?gyp/Ca	8	v. lo		
	135	5.0	35	"		60 10, 50 30 30 → 10	" various as above	5	"		
W #36-5, 139.6 ± - 140.1	140	5.0	36	"		30 65 20 30	py/spec/ ?gyp	7	"		
	145	5.0	37	"		30 50 50 20 50	"	13	"		
	150	5.0	38	"	X	80-90 10-20 60	Drusy qtz/ spec.	13	"		

#2 NOTE: No gyp. or ANHYDRITE. DETERM. TO BE QTZ, + Calcite + K clay; Ca w. hi Mn

Lithologic Log

DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______

LAT. ______ LONG. ______

DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 18-25 RUN(S) 39-47

DESCRIPTION	DEPTH	ROCK TYPE	PICTURE: COHERENCY PROFILE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER	? spec.
contin. welded tuff w fragments Si/ser/py alteration Med. gray	155										
anhed. → subhed felds. 15% lg scale splotchy - possible	160										
devitrification? (159-61') Lt + dark gray OVERLAP											
welded tuff as above rather sparse fragments	146.6 150										
fg ss. - no phenos, no frags. grains of ? specularite in qtz sand	155										
	160										
splotchy as noted above	165										
freq. sealed fracts. qtz XLS on fract. surfaces	170										
	175										
rare qtz phenos + broken XLS	180										

HOLE NO. VC-2A PROJECT ______

ATTITUDE ______ LOCATION ______ LOGGED BY ______

LONGITUDE ______ DATE ______

ELEVATION ______

INCLINATION ______ WATER FIRST MET ______

TOTAL DEPTH ______

CORE SIZE Hq

DOWN HOLE SURVEY: DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	Weathering Alteration	STRUCTURE: Faults/ Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	HYDROLOGY: Drillers Comments Mud Tank	Waters, Gases
	155	5.0	39	comp.		10 15 10	py ? tr gyp	6	v. lo		
W #40-5, 158-159'	160	5.0	40	comp.		65 70-20 80, 30 50, 20	sealed vuggy ser/spec/ qtz XLS	5			
OVERLAP	146.6 150	4.4	41	comp.		20 70-80 10, 60	clay qtz XLS spec. ? gyp	7	v. lo		
	155	5.0	42	comp.		20-40 70 70, 80, 90	sealed ser, spec, py " sealed	9	"		
frequent sealed fractures	160	5.0	43	"		90, 30 5 50 60-70 10	py, clay clay spec, " drusy qtz clay	8	"		
	165	5.0	44	"		10 70 30	? gyp spec. py, tr clay	4	"		
	170	5.0	45	"		20, 30 0-10 40-90	" py vug/qtz XLS py/qtz/spec.	5	"		
vugs on fract. surfaces	175	5.0	46	"		25 70 40, 60	py/spec. vugs as above	9	"		
	180	5.0	47	"		45 50 20 15 20	" qtz XLS py/spec/ clay " "	5	"		

Lithologic Log

Page 5 of 36

DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____
LAT. ____ LONG. ____
DATE: START ____ COMPL. ____
LOGGED BY ____ DATE ____
BOX(ES) 25-32 RUN(S) 48-51

PICTURE

MINERALIZATION AND ALT. PRODUCTS: PYRITE, QUARTZ, CALCITE, FLUORITE, GYPSUM, MAG/HEM, OTHER, FLUORITE, ? PINK MIN, ? spec.

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE
continued welded tuff as above med. gray, densely welded	185		
fault bx	190		
increase in sealed fractures - dark because of py + specularite lighter gray	195		
darker tuff, "basier"	200		
suggestion of flow structure most felds. phenos, qtz to 15% generally smaller fragments Biotite	205		
patches green sericite - altered feldspar?	210		
Itz XLS abound in honeycomb vuggy structure 212*-217± clay gouge + bx fault zone	215		
@214.5 bleached ss. frag.? ? Tuff bx ? vein bx	220		
222-250 in + out clay gouge larger frags → bx, sub ∠ last to rounded. Some w auroles	225		
? Tuff breccia Bleached	230		

HOLE NO. VC-2A PROJECT ____ PAGE 5 OF 36
ATITUDE ____ LOCATION ____ LOGGED BY ____
NGITUDE ____
ELEVATION ____
INCLINATION ____
TOTAL DEPTH ____
CORE SIZE Hq

DOWN HOLE SURVEY: DEPTH | DECLINATION | AZIMUTH

DATE ____
WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/ Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters, Gases
	185	5.0 ↑	47 ↑	Comp.		40 40-50 20	py/clay + spec.		v. lo		
		5.0	48	broken		70-80 20, 50 20	sealed, vuggy spec., qtz	6			
	190	2.5	49	Comp		50 60 10-30 20 70-90	py, spec. sealed py mud ? gyp	6			
	195	?5.0	50	"		40-70-30 30 60-80 40 30	py/spec/ ?gyp " + qtz vn bx sealed	10			
W# 51-6, 198.4-199	200	5.2	51	"		20-30 50 25 30-40 20	vuggy; vein bx py/spec/ clay " + dusty qtz	4			
	205	5.3	52	"		20 20	clay tr clay	5			
	210	5.3	53	"		70-90 70-80 50, 70	all of above dusty qtz lt. clay spec.	11			
	215	5.0	54	increasingly vuggy/ soft clayey		10+70 60-80 60-90	" vuggy all of above clay	12+	hi honeycomb vuggy hi		
W# 55-4A 218-18.8±	220	5.2	55	clay & crumbles medi. hard		70° 50 20 30	clay "	12+	med. lo		
	225	5.3	56	clayey		30 60 10 80-90 50 20, 40	clay, py " " "	7	alternat med. & hi		
	230	5.3	57	med. hard comp.		20 10 30	" " " "	10	"		

Lithologic Log

DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______

LAT. ______ LONG. ______

DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 32 - 38 RUN(S) 57-68

DESCRIPTION	DEPTH	ROCK TYPE	PICTURE: COHERENCY PROFILE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
Tuff bx continues Matrix gray, clayey Increase in no. + size of frags	235									
some frags. bleached, clayey " " hard vic 238 not brecciated then immed. a coarse bx	240.									
	245									
rounded clasts - ? conglom.	250									
250-258 sandstone uniformly fg, bleached, ivory random 2 mm * qtz grains 8% tr py + ? hem/mag	255									
no bedding observed after 256' pale peach, approaching lithographic. Few ? tuff frags. @258 gouge w py mud. 40° contact	260									
Tuff again, not brecciated lt gray Ss again, as above. cont. 70° lt gray, competent tuff - bleached Pale green sericite ? fiamme	265									
Incr. in phenos + frags. After 266.5 can see flow - 30°. Incr. in green sericite xenos XL rich. Obsidian fiamme	270									
lighter gray ash flow tuff continues decrease in green ser. patches	275									
end of conspic. flow struct.	280									

HOLE NO. VC-2A PROJECT ______ PAGE 6 OF 36

ATTITUDE ______ LOCATION ______ LOGGED BY ______

LONGITUDE ______ DATE ______

ELEVATION ______

INCLINATION ______ WATER FIRST MET ______

TOTAL DEPTH ______

CORE SIZE Hq

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/ Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters, Gases
	235	5.3 ↑ 5.2	57 ↑ 58	med. hard w softer z.		30° 30 " 40-70-20 20	gray clay " clay	12+	vugs alternat. hi + lo		
W #60-2A, 238.5±-39±	240	1.8 3.0	59 60	comp.		10 60, 40 85 70, 85	py ", clay py, p. mud " " " + ? gyp	2 8	lo med. lo		
	245	5.0	61	softer hard frags. in med. hard matrix		20 20 0° 50, 60	clay 3/4" clay clay "	10+	lo		
	250	3.0	62	med. soft		60 50, 70 10 50	" " clay, py	4	med.		
	255	5.0	63	med. hard to hard		0 15, 70, 10 40	clean lt. p. mud	8	med. → hi		
	260	5.2	64	broken med. soft		5 65 10 60	clean " py mud	12+	hi		
W #65.1, 261.3-62±	265	5.4	65	harder comp.		70 20 30 20 50 70-90	clay " py clay gouge py	8	lo v. lo		
	270	5.0	66	"		30 40, 30 30 20 40	clean py lt clay sealed	5	v. lo veggy		
rather frequent sealed fracts. w py and/or qtz XLS	275	5.2	67	"		50 30 40 20, 30 15-30	py " py	5	v. lo		
W #68-4, 279.4-9±	280	5.2	68	"		70 50 10-30 60 30	py / ? spec druse qtz XLS py "	5	"		

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______

LAT. ______ LONG. ______

DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 38-44 RUN(S) 68-78

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PICTURE / MINERALIZATION AND ALT. PRODUCTS (PYRITE, QUARTZ, CALCITE, FLUORITE, GYPSUM, MAG/HEM, OTHER, ? spec.)
tuff continues as above lt + med gray Occasional vugs, usually	285			
along fractures subhed felds. 15%, 3-10mm med. soft → clay	290			
qtz phenos + broken XLS 5-10% faint flow struct. around phenos. Random, rare fragments	295			
	300			
	305			
occ. hairline qtz vns	310			
small amts. ? obsidian	315			
	320			
	325			
Extra Si in matrix ? lt. gray splotchy phenos less distinct	330			

HOLE NO. VC-2A PROJECT ______ PAGE 7 OF 36

ATITUDE ______ LOCATION ______ LOGGED BY ______

NGITUDE ______ DATE ______

ELEVATION ______

INCLINATION ______

TOTAL DEPTH ______ WATER FIRST MET ______

CORE SIZE Hq

DOWN HOLE SURVEY		
DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	RUN	Weathering Alteration	Faults/ Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	Drillers Comments Mud Tank	Waters, Gases
	285	5.2 ↑ / 4.8	68 ↑ / 69	comp		40, 65, 50, 35, 70, 60-70, 30	py, lt clay, py, py/spec, qtz XLS, py	6	v. lo		
	290	4.0	70	slightly broken comp		70, 40, 10-20, 70, 20-60, 70, 15	py/spec, py, qtz, qtz, qtz XLS, qtz, spec	7	"		
	295	5.0	71	"		35, 45, 50, 10, 80, 5	1/4" qtz vn w/ spec. margins, py, spec, py	4	"		
W #72-7, 299-99.9	300	5.1	72	"		15, 30, 60,30, 30	sealed/ vuggy lt clay py	5	"		
vugs + XLS along fractures	305	5.0	73	"		20-40, 25, 50, 15	clay, py, py	3	"		
	310	5.0	74	"		20, 35, 30, 70, 20, 70	clay, py	4	"		
	315	5.0	75	"		30, 90, 40, 80, 70, 50 qtz	py, clay, sealed py mud	8	"		
	320	5.0	76	"		20, 70, 10-15, 70	qtz, clay, py, seri., spec., qtz XLS, clay, py	8	"		
	325	5.0	77	"		75, 15, 20, 10-20	" ", py	2	"		
W # 76-6A, 325-25.7	330	5.0	78	"		50-70-80, 88,15, 70,80, 10	clay, py, py, seri clay, py	12	"		

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 44-50 RUN(S) 78-88

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PICTURE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
Tuff as above, welded splotchy, w vugs				vugs →							
back to tuff previously noted	335										
small mafics (?)											
	340										
splotchy again for 2'±											
	345										
	350										
vug →											
	355										
splotchy	360										
lt + dark areas - could this be patchy phyllic alteration? OR devitrification?											
	365										
no regular pattern - dark splotches in lt matrix (bleached)											
	370										
end splotchy interval											
vugs →	375										
splotchy again											
T.S. 2 • vugs →	380										

HOLE NO. VC-2A PROJECT ____ PAGE 8 OF 36

'TITUDE ____ LOCATION ____ LOGGED BY ____

NGITUDE ____

ELEVATION ____

INCLINATION ____

TOTAL DEPTH ____

CORE SIZE Hq

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

DATE ____

WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/ Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters. Gases
		5.0	79	Comp. minor breaks Comp.	XX	15 70-85-90 70 40	lt. clay lt clay + vugs v. lt clay "	12+	v. lo except in vuggy areas		
	335										
W # 80-4, 337.1-38'		CORE		"	X	70, 10 70, 20 30, 10 20, 80, 90	" ? gyp " clay, py	9	"		
	340	5.0	80								
				"		20-25-30 45 60 40 20 30	? spec. gyp XLS clay, py ? gyp	12	"		
	345	5.0	81								
						80-90 40, 20	clay, gyp		"		
	350	5.0	82	broken Comp.	X	60, 70 45 10, 20	py, gyp py	12+			
				"		15	py, gyp drusy		"		
	355	5.0	83			30 60, 10	" "	14			
W # 84-3, 357.5-58.4		CORE	84	"		80, 20 30 20	lt clay sealed, vuggy	12	"		
	360	5.0		broken	X	60, 70	clean				
				Comp.		80-90	? gyp		"		
	365	5.0	85	"		90 20 60	sealed, vuggy sec clay "	12			
				"		90	? gyp		"		
	370	5.0	86			25 70 90 80-90	py, clay sealed ? gyp	9			
						20-30			"		
	375	5.0	87	broken Comp.	X	10 70-50 20 10-15	? clay lt clay	9			
				"		30 30 20	vug vugs		"		
	380	5.0	88			30 10	? gyp	12			

Lithologic Log

DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______
LAT ______ LONG. ______
DATE: START ______ COMPL. ______
LOGGED BY ______ DATE ______
BOX(ES) 50-57 RUN(S) 88-99

PICTURE

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	MINERALIZATION AND ALT PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER	?spec.
welded tuff as above; sugg. of flow; increasingly splotchy	385										
"hydrothermal alteration overprint on devitrified welded tuff" — F. Goff	390										
alternating normal + splotchy	395										
	400										
@ 401 + beyond conspic lg vugs (2"+) filled w dense white clay and/or py + qtz XLS; seldom splotchy	405										
? obsidian	410										
flow around phenos	415										
obsidian; ? cpy	420										
T.S. 1	425										
py mud/spec./gouge + vugs; qtz XLS euhed, to 1/2"	430										

HOLE NO. VC-2A PROJECT ______ PAGE 9 OF 36
ATITUDE ______ LOCATION ______ LOGGED BY ______
NGITUDE ______ DATE ______
ELEVATION ______ WATER FIRST MET ______
INCLINATION ______
TOTAL DEPTH ______
CORE SIZE Hq

DOWN HOLE SURVEY: DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	Weathering Alteration	STRUCTURE: Faults/Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	HYDROLOGY: Drillers Comments Mud Tank	Waters Gases
W # 89-9, 383.4-84	385	5.2	89	Comp.		10, 40, 15, 15, 40	?gyp; py, ?spec	12	v. lo; dis-counting vugs		
@389' py mud w slicks	390	E = 0.2'; 5.0	90			0°, 20, 10, 70, 40, 20, 20	py; py, ser., ?spec.; ?gyp	12+	"		
	395	3.6; lost 0.4	91	coarsely broken		80, 90; 0, 10, 30; 70-90 ±; 10-20	", py; py, ?spec, lt. ser.	12+	"		
		2.3; E = 0.1'	92			"	"	12+	"		
	400	3.2	93				"	12+			
W # 94-3, 401.6-402'	405	lost 0.6'; 4.6	94	comp; broken		20; 90, 40; 20; 80; 80-90	"; ?gyp; py, ?spec, clay; "	12+	"		
	410	3.9; E = 0.4'	95	Comp. w zones coarsely broken		"; 20; 30; 70; 60, 80, 20	+ qtz XLS; py; "	12+	"		
	415	5.0	96			30; 30, 60; 20; 70-90	"; ?gyp; py, ?spec.; ?gyp	9	"		
	420	5.4	97			20, 60, 50, 20, 5, 20	?gyp, qtz; py, ?spec; ?gyp	14	"		
W # 98-4 423-23.9 ±	425	5.1	98			60; 90, 30; 70, 80; 40; 20	py; qtz XLS; " ; py	13	"		
	430	5.0	99	med. hard comp.		70, 30, 15; 60, 40; 50, 40, 20; 70	qtz; py; vuggy, qtz; "	8	med. lo		

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 57-64 RUN(S) 100-110

DESCRIPTION	DEPTH	ROCK TYPE	PICTURE: COHERENCY PROFILE	PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER	? spec.
continues as above lighter gray, w lg (3"±) bleached areas, some contain vugs lg vugs persist	435										
vugs filled w dense white clay, and/or py + qtz XLS	440										
honeycomb vugs	445										
#4 + 8 - SERICITE, ILLITE, + MONTMORILLONITE	450										
	455										
	460										
	465										
	470										
	475										
	480										

HOLE NO. VC 2-2A PROJECT ____ PAGE 10 OF 36

LATITUDE ____ LOCATION ____ LOGGED BY ____

LONGITUDE ____ DATE ____

ELEVATION ____

INCLINATION ____

TOTAL DEPTH ____ WATER FIRST MET ____

CORE SIZE Hq

DOWN HOLE SURVEY: DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters, Gases
	435	5.0	100	comp.		70, 20 / 5 / 40 / 45, 60 / 50, 60	py / qtz XLS / " "	12	lo / "		
	440	5.0	101	broken / softer		80, 90 / 40 / 80, 40, 30 / 30 / 70, 90, 30	" " w py / py, ?gyp / qtz XLS / py, ?gyp	12+	med.		
W#102-2, 440.7-41.5±	445	4.5 lost 0.5'	102	crumbly v. ...		70 / 80-90 / 40-20 / "	py, spec, mud + py, clay / "	12+	med.-hi / "		
	450	4.5	103	med. hard, coarsely broken / comp, w		30 / 40, 85 / 85-90 / 20-30 / 40	" / " / py, qtz XLS / "	12+	lo except in vugs		
deposit on fract. appears botryoidal (?), milky white	455	5.3	104	vugs + clay z.		10-30 / 10-20 / 30-60	clay, py / clay gouge 2"± / ?gyp	8	"		
	460	5.2	105			70-80 / 10-30 / 50 / 20 / 80-30	", ?clay / " / clay / "	12	"		
W#106-2, 460.3-61.2±	465	5.0	106			60 / 30 / 20 / 60, 90 / 70-20	py / ?clay / "	14	"		
	470	5.0	107			20 / 30 / 30 / 20, 50 / 20	clay, py, qtz / " / "	9.	"		
	475	5.0	108			50 / 10, 20 / 30 / 80	?clay / clay, py, qtz / "	10+	"		
		2.5	109			90, 30 / 10, 20 / 70	?clay / " / "	8	"		
	480	3.0	110			20 / 30	"	10			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 64-71 RUN(S) 110-120

PICTURE

MINERALIZATION AND ALT. PRODUCTS

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER ? type,
welded tuff continues devitrified + bleached ltgy + felds. phenos abound. Tr biotite	485			•						
lg bleached patches XL rich - phenos + broken XLS, 20% ±	490			•						
@491 last of the big vugs, filled w dense white clay, qtz XLS, + pink clay (?) bleached (rhodochrosite color)	495			•						
rare fragments bleached + devitrified vuggy zone	500			•						
some flow around phenos	505			•						
bleached tuff, no vons, no vugs	510			•						
bleached / devitrif. lg bleached patches (4-5"), irreg. in outline	515			•						
	520			•						
	525			•						
1 smaller vug	530			•						•

HOLE NO. VC2-2A PROJECT ____ PAGE 11 OF 36

ATITUDE ____ LOCATION ____ LOGGED BY ____

NGITUDE ____

ELEVATION ____ DOWN HOLE SURVEY DATE ____

INCLINATION ____

TOTAL DEPTH ____

CORE SIZE Hq

DEPTH	DECLINATION	AZIMUTH

WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	ROCK RUN	ROCK Weathering Alteration	STRUCTURE Faults/Shatter Zones	STRUCTURE DIP	STRUCTURE Infilling	STRUCTURE Fracture Frequency	STRUCTURE Porosity	HYDROLOGY Drillers Comments Mud Tank	HYDROLOGY Waters. Gases
W# 111-6, 482.6 - 83.2 ±	485	5.0	111	comp.	X	40-50 40-60, 20 40, 30 50	py ? clay ? gyp "	8	lo		
		lost 0.2'				70-80 20 10	py, clay "				
freq. "? clay" on fractures is wispy pale green	490	4.4 E = 0.4'	112	vuggy		50, 20 60 20	? clay, ? gyp " vuggy	14	vug/hi		
Have sampled for proper determination	495	5.0 ±	113	comp. vug broken comp.		60 60 70-80 30	? clay ? gyp ", + py vugs clay ? ; py	12+	lo vug/hi lo		
W# 114-8B, 498.8 - 500.1	500	5.0	114	broken comp.		60 80 80 30 80-90 + 30	" " " "	13			
	505	5.3	115	broken		10 30 70-90	" " complex. py soluble	14			
avocado green sericite clay on fracts. Remnant chloritic seen, ∴ chlorite → sericite	510	5.3	116	comp.		10 60 70 70 30 50	py green ser. " (polygon) clay white clay + py	15			
	515	5.3	117			20 40 50 → 80 80 → 90 70	" " " " + pink clay wh. clay, py	8			
@ 519', 1" clay g. / py mud, 70°	520	5.3	118			60-70-50 75 70-90 70	" wispy white clay " + py py	12+	med. lo		
W# 118-9A, 520-21	525	5.5	119	broken comp.		60 60, 40 60, 30	white clay + py " "	13			
	530	5.3	120	broken		50 20 70-90 50 85-90, 60	" " " "	13			

Lithologic Log

DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______

LAT. ______ LONG. ______

DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 71-77 RUN(S) 120-130

PICTURE

MINERALIZATION AND ALT. PRODUCTS: PYRITE | QUARTZ | CALCITE | FLUORITE | GYPSUM | MAG/HEM | OTHER

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE
welded tuff lg bleached patches	535		
Vn bx: white clay, gray clay, lg green fluorite XLS octahedrons (3/4") → 540. splotchy	540		
white clay vns	545		
conspic. white clay vugs + vns pink clay #5 - SERICITE, MONTMORILLONITE, + ILLITE	550		
green + pink cl. #6 - RHODOCROSITE #7 - CLAYS AS ABOVE, + CHLORITE	555		
white clay w pink clay pebbles green clay pale green clay green clay	560		
green clay green	565		
pale gr. clay good flow around phenos contin. green clay	570		
probably sericite clay derived from chlorite feldspars going to clay	575		
some w green (? chlorite) centers	580		

HOLE NO. VC-2A PROJECT ______ PAGE 12 OF 36

LATITUDE ______ LOCATION ______ LOGGED BY ______

LONGITUDE ______ DATE ______

ELEVATION ______

INCLINATION ______ WATER FIRST MET ______

TOTAL DEPTH ______

CORE SIZE Hq

DOWN HOLE SURVEY		
DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	RUN	Weathering Alteration	Faults/ Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	Drillers Comments Mud Tank	Waters Gases
	535	5.3 5.3	120 121	coarsely broken comp. vug		20, 75 30 60 70-90	wafy clay py, spec py, spec. " "	10	med. lo		
W#122-4, 538.5-39.3±	540		122	vug comp. broken		75, 40 60, 70 70-90 60, 30 70	wafy clay " " " " " " " "	14+			
	545	5.3 5.3	123	clayey crumbles comp.		70 40 10 70-80 70 40	clay g., 2" clay, py py clay py clay	12	hi med hi lo		
	550	6.3	124	vugs + clay		50 60 35 10 50 20	white clay w pink wh. clay py wh. clay "		lo except for vuggy areas		
OVERLAP IN ? MARKED INTERVALS 551 — or 553.3 —	555	5.0	125	comp. vugs + clay in comp. core		40 60 60-70 60 85, 40	" pale green clay " wafy green ser clay + spec.	16			
W#126-7, 158-58.7'	560	6.0	126	clay comp.		60, 20 70-90 20 30 10 60	gr. clay " " wh clay wh + gr ser clay gr clay	7			
	565	5.0	127	coarsely broken comp.		50, 10 10 10 70-90 45 30	" " py gr clay gr. clay	7			
@566 green chlorite on fract. w slickensides	570	5.0	128			60-40 80-90 40 20 85-90 30	" " " " gr + wh clay lt clay	9	v. lo		
	575	4.5 lost .5	129			30 10-20 50 20-30-80 60	wh clay lt " gr + wh cl. wh + gr cl wh cl., py	7			
W#130-8, 579.6 - 80.3	580	5.3	130			20 40 40	lt clay white clay	7			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 77-84 RUN(S) 130-140

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PICTURE	MINERALIZATION AND ALT PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
welded tuff pale green clay XL rich											
Same green pumice/fiamme	585										
lt + dk green clay vns + pods	590										
splotchy, bleached, devit. islands of green clay w/ lots green clay patches XL rich. Flow around phenos	595										
not as bleached, not splotchy Felds. w/ grains of chlor. Conspicuous green coating on fractures. Chlor → lav.	600										
diffuse, chlorite (1mm±), sparse py chlorite fiamme chlorite coats qtz phenos	605										
	610										
occ. hairline qtz onlets	615										
	620										
	625										
	630										

HOLE NO. VC-2A PROJECT ____ PAGE 13 OF 36

TITUDE ____ LOCATION ____ LOGGED BY ____

NGITUDE ____

ELEVATION ____ DOWN HOLE SURVEY DATE ____

INCLINATION ____

TOTAL DEPTH ____ WATER FIRST MET ____

CORE SIZE Hq

DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/ Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters. Gases
				comp.		20	white clay		v. lo		
						60-80	green "				
						" "	" "	8			
		5.0	131			20	white clay				
	585					30-80	clean				
						10-20	gr. clay				
						40	" "				
						25	" "	4			
		5.0	132								
	590					15	" "				
				coarsely broken comp		80-90	dsk gr clay				
				coarsely broken comp		40	lt gr clay				
						30-90	dsk gr "				
		5.0	133				" "	11			
				coarsely broken comp		5, 70	" "				
	595					50	lt. " "				
						80	" " "				
						50	dsk " +				
		5.0				10-30-40	lt " "		lo		
						25	" " "	9			
W# 134-7, 598-99.2			134				"				
	600					70-90	Ca				
						80-90					
						20	clean				
				coarsely broken comp.		70					
						75-90	green clay + Ca				
		5.0	135			20	lt. clay	12+			
	605				XX	70-90	dsk green				
						10	clean + Ca				
						70	dsk green				
		5.0	136	broken comp		60-70-90	gr. white clay + ? spec.	13			
	610										
						10-15	clean				
						20	tr clay				
						70	wh. gvcl				
		5.0	137	broken comp.		40	½-1" gr clay gouge	13			
	615										
						35	? spec. Ca				
W# 138-1, 616-16.8						85	gvcl/spec				
						30	gr clay				
		4.5	138			10	clean	12			
	620					60	gr clay				
		lost 0.5				70-90	" "				
						5	clean				
		5.0	139	broken		70	clay/spec	12+			
	625					80, 10	? spec.				
						70	clay "				
				comp.		30-40-90	lt clay,				
						45	lt clay	12+			
		5.0	140			25	"				
						20	"				
	630					85-90					

Lithologic Log — Page 14 of 36

DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____
LAT. ____ LONG. ____
DATE: START ____ COMPL. ____
LOGGED BY ____ DATE ____
BOX(ES) 84-92 RUN(S) 140-151

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
welded tuff as above calcite + green clay	635			·		·				
bleached, devit good flow around phenos	640									
essentially no pyrite Ca vn (3/4") w green cl. borders	645					·				
Ca vn and bleaching tuff w flow 20°	Ca 650					·				
crowded w phenos dark swirly matrix, abund. fiamme	655			·						
	660									
frags.	665									
	670									
	675									
	680									

HOLE NO. VC-2A PROJECT ____ PAGE 14 OF 36
ATITUDE ____ LOCATION ____ LOGGED BY ____
NGITUDE ____ DATE ____
ELEVATION ____
INCLINATION ____ DOWN HOLE SURVEY (DEPTH | DECLINATION | AZIMUTH)
TOTAL DEPTH ____ WATER FIRST MET ____
CORE SIZE Hq

COMMENTS	DEPTH	CORE RECOVERY	RUN	Weathering Alteration	Faults/Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	Drillers Comments Mud Tank	Waters. Gases
	635	5.0	141	broken	X ⊥ X — X I X	80-90 20 10 80-90 20	lt clay Ca clean lt clay	12 ++	v. lo		
dark green ? clay on surfaces is prob. chloritic Small ante: calcite w chlorite on surfs.	640	3.0 1.0	142 143	comp	X X X X	80-90 20 20 75	dk green clay/spec. clean lt clay	12 ++ 2			
W# 144-6, 641.6-42.3'	645	4.6	144	broken		70 45 40 80 30	clean lt clay " " dk gn cl. + spec. lt clay Ca	7			
	650	5.0	145	comp.	X X	75 30 50 5	? grn lt. clay white " sealed/clay clean	12+			
	655	5.3	146	coarsely broken comp.		20-30 60, 80 30 25	sealed/clay green clay white " wh gn " Ca	15			
	660	5.0	147	broken		20 75 15 30	gn. clay " " clean lt. clay Ca	9	lo		
W# 148-2, 660.4-661.3 definite chlorite on surf	665	5.0	148	comp.		50 10 40 30 75	clay/spec. lt. clay chlor/clay py, Ca lt clay	11			
lower 4 fractures often clean	670	5.0	149	coarsely br.		30 50, 60 10-15 70 70	chlorite chl., clay, ? spec clean Chlor/spec chl./clay	15			
	675	5.1	150	comp.		25 15 80-90 50 20 80-85	chl/spec. Ca chlor/clay lt. clay chl./clay	13	v. lo		
	680	5.0	151		X X	50 75 70,15 60-80-90 80-90	clean lt gn clay chl/spec/py, Ca lt. clay clay gouge	10+			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 92-97 RUN(S) 152-161

PICTURE

MINERALIZATION AND ALT. PRODUCTS

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER	? Zeo.
welded tuff as above											
flow distinct, 30°	685										
frag.											
frag.	690										
white clay xpnod 2-5mm some w chlor within - some may have been pumice											
bleached	695										
	700										
vugs w green clay											
many pale green xpnod green fiamme	705										
XL rich tuff, bleached, somewhat argill. matrix. Cavn	710										
green sav xpnd w sed hom. sim few small dark fragments											
Not a green tuff but persistent chlor/sap clay on fractures, and pale green sec. alter. of frags/phenos/fiamme the rule - make up 35% of rk	715										
	720										
incrs in no. of frags.											
frag. w green sim	725										
	730										

HOLE NO. VC-2A PROJECT ____ PAGE 15 OF 36

TITUDE ____ LOCATION ____ LOGGED BY ____

NGITUDE ____ DOWN HOLE SURVEY DATE ____

ELEVATION ____

INCLINATION ____

TOTAL DEPTH ____

CORE SIZE Hq

DEPTH	DECLINATION	AZIMUTH

WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/ Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters. Gases
W# 152-1, 680-80.8'				Comp		70	lt gr. clay		v. lo		
						30	clean				
		5.3	152			40	lt. clay	14			
	685					15	chlor/ham/ calcite				
						25	pyr/chlor				
						70	ham/chlor				
						40	" "		lo		
		5.3	153			35	calcite	12+			
						20	chlor, spec.				
	690					70, 30	calcite				
						80	"				
						80, 50	lt gr. clay				
						55	chlor, ca				
						50	" " + spec.				
		5.3	154			70, 30	chl., ca	11			
						85	" "				
	695					40	gr clay		med.		
						70	clay				
						80	"				
		5.3	155			30, 90	"	12+			
						30	"				
	700			broken comp.	X X X						
						30	lt clay				
						70	clean		hi (vuggy)		
W# 156-5, 702.4-703.2						60	lt chlor	11			
			156			30	"				
	705	5.3				40	chlor/pyr/ calcite		med. lo		
						70	lt chlor				
						50	¼" calcite				
		5.0	157	broken	X X X	30	clean	15			
	710					40	chl/ser mud				
						80	"				
				comp.		20	chl/ser				
						15	clean				
		5.0	158			40	chl/ser	3			
	715					10-40	clean				
						30-40	clean				
		5.0	159					3			
	720					0-5	clean				
						10-30-40	"				
W# 160-1, 721-22											
		5.0	160			20	chl/ser	5			
	725					10-20-40	clean				
						25	chl/ham/ ser				
						40	lt clay				
		5.0	161			20-30	clean	7			
						20	clean				
	730					85-90	chl/ser w slicks				

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 97-105 RUN(S) 161-171

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PICTURE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
bleached tuff continues sparsely. Green veins + fractures the most striking features	735									•	
ca vn	740						•			•	
ca vn	745				•		;			•	
matrix still argill., now ivory colored more green fiamme	750				•					•	•
flow structure less bleached - now a tan color ? tr biotite disem. in gmass ?	755									•	•
	760										•
	765										
green alteration of frags. + fiamme, not feldspars gmass less argill, deeper tan or lt brown color	770										•
	775										
	780										

HOLE NO. VC-2A PROJECT ____ PAGE 16 OF 36

TITUDE ____ LOCATION ____ LOGGED BY ____

NGITUDE ____

ELEVATION ____

INCLINATION ____

TOTAL DEPTH ____

CORE SIZE HQ

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

DATE ____

WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters, Gases
	735	4.0 ? lost 1'	162	comp.		80-90 10-20 50 10 40 10 40-50	chl/sar. clean chl/sar lt. clay " clean chl/sar	5	med		
	740	5.3 lost 9" (?)	163	softer comp.		70 80-90 50 30 20	clean chl/sar " lt. clay "	7	hi med		
W #164-2, 740.9-41.6'	745	5.0	164			70, 30 30 70 25 20-30	chl/sar clean " chl/sar to horn chl/sar clean	9			
	750	5.3	165			70 70 40 40-50 20 70 40	calc to gr. clay chl/ca chl. clay " " lt. clay chl/cal ltgn. clay	12			
	755	4.7	166			0-10 40	clean chl/clay	3	med lo		
	760	lost 3 5.0	167			20 70-80-90	clean scaled chl/ca	2			
W #168-3, 763-63.9	765	5.0	168			70 10 (clean) 15-20-90	scaled chl/ca clean/ gn. clay	4			
	770	5.0	169			15 70 20	clean " "	3			
	775	5.3	170			70 10-20	" "	3			
	780	4.7	171			10-30	•	1			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 105-111 RUN(S) 171-181

PICTURE

MINERALIZATION AND ALT. PRODUCTS

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
lt. brown tuff as above conspic. small white felds. green fragments + fiamme. I think I see anhed. smudgy biotite. Flow around phenos	785									
becoming bleached - gray/tan no more distinct flow	790									
	795									
more green fiamme ivory groms	800									
still lighter colored/bleached mod. argill. matrix, white	805									
no mafics	810									
pale green aspect - green xenos to 50% of rk	815									
bleached decrease in green xenocrysts noted above (apparent decrease, perhaps just very bleached)	820									
to mafics, qtz less conspic, white somewhat argill. matrix	825									
more conspic green fiamme + frags - again to 50% of rk flow 20-30° py cubes	830									

HOLE NO. VC-2A PROJECT ____ PAGE 17 OF 36

'TITUDE ____ LOCATION ____ LOGGED BY ____

NGITUDE ____

ELEVATION ____ DOWN HOLE SURVEY DATE ____

INCLINATION ____

TOTAL DEPTH ____

CORE SIZE Hq WATER FIRST MET ____

DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	ROCK RUN	ROCK Weathering Alteration	STRUCTURE Faults/ Shatter Zones	STRUCTURE DIP	STRUCTURE Infilling	STRUCTURE Fracture Frequency	STRUCTURE Porosity	HYDROLOGY Drillers Comments Mud Tank	HYDROLOGY Waters. Gases
	785	5.0	172	Comp.	~/ —	5-20 80 / 30	clean " / "	3	med.		
W#172-3B, 784.6-85.2	790	5.0	173		/	45	chl/ser	1	lo		
	795	5.0	174		—	5	clean	1			
	800	5.0	175		—	20	clean	0			
W#176-1, 801-02'	805	5.0	176		/ /	40 / 60 / 40	chl. + white clay ? gyp / chl. clay	3			
	810	5.0	177		—	20	pale green clay	1	v. lo		
	815	5.0	178		/	50 / 5-30	clean "	2			
	820	5.0	179		~ ~ —	5-30 / 5-20 / 30	clean " / lt. clay	3	med.		
W#180-2, 822.7-23.2	825	5.0	180					0			
	830	5.0	181		~ /	5-15 / 40	clean "	2			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 111-118 RUN(S) 181-191

PICTURE

MINERALIZATION AND ALT. PRODUCTS

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
welded tuff as above, w conspic. green fenos & minor quartz	835			.					.	
more qtz- or maybe just more visible	840			.					.	
felds phenos w. indistinct	845			.					.	
	850			.					.	
	855			.					.	
	860			.					.	
	865			.					.	
bleached, but apparently same as above XL rich	870			.					.	
	875			.					.	
larger green patches in addit. to. fiamme	880			.					.	

HOLE NO. VC-2A PROJECT ____ PAGE 18 OF 36

'TITUDE ____ LOCATION ____ LOGGED BY ____

NGITUDE ____

ELEVATION ____

INCLINATION ____

TOTAL DEPTH ____

CORE SIZE Hq

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

DATE ____

WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters Gases
	835	5.0	182	Comp.	/	50°	clean	1	med.		
	840	5.0	183		/ — — /	45 5-10 0-5 30-40	lt. clay clean " lt. clay	6			
	845	5.0	184		— — — —	0-20 0-5 0-10 0-5	clean " " "	2			
W#184-4C, 845-46'	850	5.0	185					0			
	855	5.0	186		— —	0-5 0-5	clean "	2			
	860	5.0	187		~ / —	30 15 10	" " "	5			
	865	5.0	188		— /	0 30-50	" lt. clay	1			
W#189-1B, 868-69'	870	5.0	189		~ ~	15 20-30	clean lt. clay	1			
	875	5.0	190					0			
	880	4'4" lost 8"	191		—	10	clean	1			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______

LAT. ______ LONG. ______

DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 118-124 RUN(S) 191-201

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
exactly as above generally bleached, w green xenos white, mod. argill. matrix	885			·					·	
	890			·					·	
	895			·						
less bleached, no longer argill. tan → lt brown matrix good flow 30°	900								·	
regular pattern of fiamme, (slender) fewer frags/patches Can see felds. phenos; biotite must be dissem. in gmass	905			·						
larger pumice - not densely welded as above end of green alteration	910								:	
(< 5% now) (occ. on fracts.) no more green "aspect" to core now gray-brown very "busy" felds. phenos; qtz	915			·						
swirly flow around phenos tiny chlorite + biot	920			:					:	
	925			·					·	
	930			·					·	

HOLE NO. VC-2A PROJECT ______ PAGE 19 OF 36

LATITUDE ______ LOCATION ______ LOGGED BY ______

LONGITUDE ______ DATE ______

ELEVATION ______

INCLINATION ______ WATER FIRST MET ______

TOTAL DEPTH ______

CORE SIZE Hq

DOWN HOLE SURVEY		
DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters. Gases
	885	5'4"	192	comp.		70-80 5-20	clean "	3	med.		
W#192-3B, 885.1-886'.	890	5.0	193			10-30 40	" lt green clay	2			
	895	5.0	194			5 80-90	clean green clay	2			
	900	5.0	195			20	clean	1			
W#196-4, 904.-04.9±	905	5.0	196			15 30	clean gr. clay	1	med. lo		
	910	5.0	197			25, 70 80	gr. clay gr. clay + sag? + ?hem	4			
	915	5.0	198			0-20 60-90 15 30	lt. white cl. clean lt. white cl. clean	4			
	920	5.0	199			60 60 0-50 60 60	gr. clay " " " " + py " " " " " + ? hem	7			
W#200-1B, 921.5-26'	925	5.0	200			30 " 70 75 80 70	clean " green clay " " " " " " + py	8			
	930	4.9	201			90 50	clean lt clay	2			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 124-130 RUN(S) 201-211

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PICTURE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
non-welded tuff, gray-brown XL rich, feldspars anhedral smudgy biotite lg pale green pumice	935				.					.	
	940				.					.	
	945				.						
	950				.						
seems siliceous in groundmass, Si/ser	955				.					.	
	960				.						
	965				.						
	970				.						
	975				.						
	980				.						

HOLE NO. VC-2A PROJECT ____ PAGE 20 OF 36

TITUDE ____ LOCATION ____ LOGGED BY ____

GITUDE ____

ELEVATION ____ DOWN HOLE SURVEY: DEPTH | DECLINATION | AZIMUTH ____ DATE ____

INCLINATION ____

TOTAL DEPTH ____ WATER FIRST MET ____

CORE SIZE Hq

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters, Gases
	935	lost 0.1		comp	—	15	clean		lo		
		5.0	202		/	70	grn clay				
						70	" + py				
					L	10-20	clean	5			
					—	0-5	"				
	940				/	60-0	"				
		4.9	203			75	grn clay + py				
					~	0-10	clean	4			
					⌓	10-20	"				
	945	lost 0.1			/	60	"				
		5.0	204		—	10	"				
W#204-4, 944.4-944.9'					/	80	grn clay	4			
						50	"				
	950				/	80	"				
		5.0	205		E	10	clean				
					—	0	"	9			
					⌓	0-20	"				
	955				/	60-70	clean				
		5.0	206			70	gr. clay, py				
						50-60	" "	9			
						10, 70	clean, ser clay				
						80	gr. clay, py				
	960				/	5	clean				
		5.3	207			70	"				
						5	"	1			
						0-20	clean				
	965				/						
		4.7	208					1			
W#208-2, 965.2-65.7					/	0-50	clean				
						15	clean				
		5.0	209			70	clay/py				
						30	gr. cl./py	9			
	970					70-90	chl/py				
						70	" "				
					/	5	clean				
		5.3	210			40, 80	py, chl				
						15	clean	5			
	975					"	"				
						60	lt clay, py				
					/	15	clean				
		5.0	211			60	chl/ca				
						20	clean	4			
	980					10	"				

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 131-137 RUN(S) 211-222

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PICTURE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
gray non welded tuff continues pale green pumice to 2"x1" XL rich anhed. feldi.	985										
(F.G. calls all this welded.)	990										
	995										
frags. inconspic., rare	1000										
calcite vns w chlorite selvages	1005										
vic. 1007.5 abrupt end to lg green pumice. Now welded fragmental some small green flamme	1010										
chlorite vns. dark gray hard sk black flamme - obsidian hair-line calcite vns	1015										
flow around phenos fresh sock tan obsidian-pumice tuff matrix charcoal gray	1020										
subhoriz. foliation 25°	1025										
	1030										

HOLE NO. VC-2A PROJECT ____ PAGE 21 OF 36

ATITUDE ____ LOCATION ____ LOGGED BY ____

NGITUDE ____ DATE ____

ELEVATION ____

INCLINATION ____

TOTAL DEPTH ____

CORE SIZE Hq

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/ Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters. Gases
				Comp.		10	clean		lo		
		5.0				70	chlor clay				
						10, 50	clean				
W#212-6A, 983.3-84	985		212			60, 70	chlor, py, ser.	7			
						5, 10	clean				
						0-10	"		med.		
		5.0	213			0-5	"	2			
	990										
						70	chlor, py, ser.				
						60	"		lo		
		4.7	214			20, 30	clean	6			
	995					5-30	"				
						10	"				
						55	chlor, ser. + py				
						70	"				
		4.9	215			50-60	"	5			
	1000					15	clean		med.		
		lost a1				0-10	"				
						5	"				
						90	chl, py, ser				
		2.8	216			20	clean				
W#217-1B, 1004.5-05.5	1005					70-90	chl, py, ser	4			
						70	"				
			lost 2.2			80	"				
(note: waxed piece is in box 134 at 1007.5', within seq 217			217			80	"				
						65	", slicks				
?? →		4.8				15	clean	5			
		E 2.3				10	"				
	1010					70, 20	chl, py, ser + cer				
			218			60	"				
						30	clean				
		5.25				60, 80	chl, ser, py, ser.	10			
						10	chlor, py				
	1015					40	py, hem, ? chlor				
						70	" w "				
		5.25	219.			20	clean	5			
						70	py				
						10	"		mod. to lo		
	1020					75	py, hem, " chlor				
								4			
		5.25	220			10	clean				
W#220-1D, 1023-24	1025					60	py, chlor				
						70	py				
						80	"				
		5.1	221			20	clean	12			
						70	py, chl.				
	1030					10-20	clean				

Lithologic Log

DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______

LAT. ______ LONG. ______

DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 137-143 RUN(S) 222-232

DESCRIPTION	DEPTH	COHERENCY PROFILE (PICTURE)
same densely welded tuff as above flow 40°	1035	
decr. in conspic. fiamme	1040	
lighter gray matrix, slightly argill.	1045	
becoming bleached, felds indistinct fabric swirly, ambiguous. No more obsidian gmass silic. contact @ 1049.2, 55° ? structural contact	1050	lt. weight
aspect of a lithographic ss, w conchoidal fracture. Green lithic frags sparse. An air-fall tuff - depos. in water? Ivory feldspars appearing	1056	Qtz frags. sericitized matrix not a ss tr chlorite
tuff as @ 1047± - swirly texture fiamme appearing, lg & small a distinct fragmental tuff	1060	
med. gray, XL rich	1065	
	1070	
lighter gray, felds. phenos a little less distinct	1075	
	1080	

Columns: ROCK TYPE; COHERENCY PROFILE; MINERALIZATION AND ALT. PRODUCTS: PYRITE, QUARTZ, CALCITE, FLUORITE, GYPSUM, MAG/HEM, OTHER

HOLE NO. VC-2A PROJECT ______

LATITUDE ______ LOCATION ______ LOGGED BY ______

LONGITUDE ______ DATE ______

ELEVATION ______

INCLINATION ______

TOTAL DEPTH ______ WATER FIRST MET ______

CORE SIZE Hq

DOWN HOLE SURVEY		
DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	RUN	Weathering Alteration	Faults/ Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	Drillers Comments Mud Tank	Waters. Gases
	1035	5.1	222	Comp.		70 30 70, 30 85 80	py, chlor, slicks " " "	10	med. to lo		
	1040	5.0	223			5, 10 80 65, 20 60 5	clean py, chlor ", " ",",+ca clean	10			
W# 224-1C, 1041-41.9'	1045	4.25	224			70 10 60 60, 30 0-5	chl, py, ca clean chl, py, ca, ? hem chl, py, ca, ser clean	4	med.		
	1050	5.1	225			80, 60 30, 85, 90 70, 10, 50 60, 10	chl, py, ser, ca " " clean "	12	hi		
	1055	5.3	226			10-20 20, 60 60 70 10 50	" " " chl, ca clean ltgr. clay	12+			
	1060	5.1	227	broken comp.		80 30 70-90 10, 70 70	chl, ca clean chl, ca clean chl, py, ca	12+	med.		
	1065	5.3	228			15 5 10	clean " "	4			
W# 229-2, 1064.7-66	1070	5.3	229			10 45 5-10 70	" ser, dk min. clean chl, ca, py	6			
	1075	5.3	230	broken comp		90 40 75 45 10-20 70	" " (less) chl, py, ca, ser. " clean chl/py	13			
	1080	5.0	231			70 70-80-90 60	clean chl, py, ca chl, py, ca, dk min	6			

Lithologic Log — Page 23 of 36

DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____
LAT. ____ LONG. ____
DATE: START ____ COMPL. ____
LOGGED BY ____ DATE ____
BOX(ES) 143-149 RUN(S) 232-243

PICTURE | MINERALIZATION AND ALT. PRODUCTS

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
welded tuff continues as above	1085									
	1090									
calcite w chlorite salvages	1095									
	1100									
	1105									
	1110									
	1115									
	1120									
darker matrix - gray/brown, w many felds phnos visible	1125									
	1130									

HOLE NO. VC-2A PROJECT ____ PAGE 23 OF 36
LATITUDE ____ LOCATION ____ LOGGED BY ____
LONGITUDE ____ DATE ____
ELEVATION ____
INCLINATION ____
TOTAL DEPTH ____
CORE SIZE Hq

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters, Gases
W# 232-4, 1083.2-84	1085	5.1 (97%)	232	comp.	/	60 20 70	calcite clear chl, ca	3	med. to med. hi		
	1090	4.0	233			80-90 10 90	ca, chl clear ca	8			
	1095	4.0	234	split 90°±		80-90 80-90 70	ca, chlor " " " "	6 11			
	1100	5.0 3.0	235 236	comp.		20 80	clear chl, ca	1			
	1105	5.0	237	split 90°± comp.		10 60 30 85-90 10	lt clay chl ca clear chl, py, dark min clear	8			
W# ? , 1107.5-08.3	1110	5.0	238			60 70-90 50 10-30 75	chl, py ca w chl sols. clear " chl, py	7			
	1115	5.0	239	coarsely split comp		70-80 65, 80 80 50	" ", ca " " " " " " " " "	7			
	1120	4.6	240			5 70 60 10 60, 80	" " " sealed ca + chl. chl/py/ca clear chl, py, ca	5			
	1125	4.6	241	broken comp.		5-20 70-80-90 60 70	clear chl, ca, py ca/chl sols. chl/py/ca	8			
W# 242-5, 1125.4-26.4±	1130	4.0 3'	242 243			0-20 50 10 50-60	clear chl/py/ca clear chl/py/ca	5 8			

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____
LAT. ____ LONG. ____
DATE: START ____ COMPL. ____
LOGGED BY ____ DATE ____
BOX(ES) 150-155 RUN(S) 243-254

PICTURE | MINERALIZATION AND ALT. PRODUCTS

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
welded tuff as above, med. gray + other frequent calcite vns w chlorite selvages	1135									
	1140									
dasket 1144'- beg. of green altered fiamme in lighter tuff (lt gray/ivory mat.)	1145									
all fiamme + frags. green (chlorite) folds phenos indistinct flow 40°	1150									
1152 - change in aspect frags of lg fiamme green (lt) smaller fiamme brown - black + incompic	1155									
ss lt gray folds distinct chlorite → pale grn sericite clay 1158 - again, change. Bleached, w nearly pervasive green	1160		vnlets of py, mud or chlor.							
sericite alteration. Matrix white lithic frags. persist, dark pale green fiamme, folds indistinct outside of core vuggy, weathered, "moth-eaten", pitted	1165									
fabric essentially destroyed, except for 35% qtz XLs se-entrants @ contact w ? ss, 20° sandy tuff or tuffaceous ss ?	1170									
lg grains in hard ivory matrix uniformly fg laigas (2-5 mm) green clay xenos random vugs, outside of core	1175		? bedding 60°							
some calcite vug fillings	1180									

#8 - same clays as above

HOLE NO. VC-2A PROJECT ____ PAGE 24 OF 36
TITUDE ____ LOCATION ____ LOGGED BY ____
NGITUDE ____ DATE ____
ELEVATION ____
INCLINATION ____ DOWN HOLE SURVEY: DEPTH | DECLINATION | AZIMUTH
TOTAL DEPTH ____ WATER FIRST MET ____
CORE SIZE Hq

COMMENTS	DEPTH	CORE RECOVERY	ROCK RUN	ROCK Weathering Alteration	STRUCTURE Faults/Shatter Zones	STRUCTURE DIP	STRUCTURE Infilling	STRUCTURE Fracture Frequency	STRUCTURE Porosity	HYDROLOGY Drillers Comments Mud Tank	HYDROLOGY Waters. Gases
	1135	5.0	244	comp. / broken		10 / 60 / 0-20 / 55 / 75	clean / chl/py/ca / chl/py/ca / chl/py/ca	9	med. to mod. hi		
	1140	5.0	245	comp / broken		50 / 80 / 60 / 5 / 60 / 40	" " " / " " " / " " " / clean / ca/chl sslv, chl/py/ca	11			
	1145	5.0	246	comp.		0-20 / " " / 15 / " / 50-70	clean / " / " / " / chl/py/ca	6	mod		
W# 247-3, 1147-47.7	1150	5.0	247			10 / 0-5 / 20 / 10 / 0	clean / " / " / " / "	9			
	1155	5.0	248			5 / 10 / 15	" / " / "	4	mod. hi		
	1160	5.0	249			5 / 20 / 0-10	" / sax clay / " "	2			
	1165	3.9	250			30-0 / 30 / 0-30 / 5	" " / " " / " " / " "	5	hi		
seally 169	1170	4.0	251	broken "moth-eaten" / comp.		0 / 25 / 10 / 30 / 80-90 / 0-20	" " / clean / " / " / " / "	12+			
	1175	5.0	252			0 / 70-90 / 60 / 0-15 / 10	" / " / " / " / "	7			
W# ?, 1179.1 - 1179 seally 1176.6 @ 1179	1180	2.6	253					0			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______

LAT. ______ LONG. ______

DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 155-162 RUN(S) 254-264

MINERALIZATION AND ALT. PRODUCTS: PYRITE, QUARTZ, CALCITE, FLUORITE, GYPSUM, MAG/HEM, OTHER

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE
ss. continues as above	1185		
1186.3 contact w tuff, 60°. Chlor. on fract. altered, green, fragmental tuff green fiamme, + green in gmass bleached, white matrix, argill.	1190		ca vn
felds phenos blurred @1191 change - tan matrix, green fiamme + frags, conspic. felds. phenos. Matrix hard, somewhat silic.	1195		? vnlets
good flow 40°, densely welded	1200		
1203-04 vague contact w less densely welded tuff. Flow	1205		
continues, fiamme pale aqua, fatter (1/4") ca vns w chlorite selvages	1210		
bleached, pitted, fragmental, no green alter., or very bleached green fiamme inconspic. tan gmass, tr biot	1215		
continues partially welded green fiamme, felds phenos tan matrix	1220		
bleached pale green/white, same tuff but little fabric remains prob. more densely welded	1225		
end of green alter. contact 30-40° brown aspect - gmass sil, tan. crowded w felds phenos - to 50% Qtz 15-20%, biot. Can't see pumice (or scarce) 4"±, then not vanity	1230		black (30°) fiamme "gneissic aspect"

(see p. 26 A, detail descr.)

HOLE NO. VC-2A PROJECT ______ PAGE 25 OF 36

LATITUDE ______ LOCATION ______ LOGGED BY ______

LONGITUDE ______ DATE ______

ELEVATION ______

INCLINATION ______ WATER FIRST MET ______

TOTAL DEPTH ______

CORE SIZE Hq

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	RUN	Weathering Alteration	DIP	Infilling	Fracture Frequency	Porosity	Drillers Comments Mud Tank	Waters. Gases
1181 really 1180	1185	2.0 / 5.0	254 / 255	comp	70-80	clean	1 / 0	hi		
1186 really 1184	1190	5.0	256		60 / 0-30 / 0-5 / 20	ca w chl selv / clean / " / lt. clay	5			
	1195	5.0	257		20 / 0-10 / 0-10	" " / " " / clean	2			
W# ?, 1195-95.7	1200	5.0	258				0			
	1205	5.0	259		20 / 10 / 0-15	clean / " / clean	3			
	1210	5.0	260		60 / 70 / 20-30	sealed/Ca / Ca/sealed poly / clean	2			
	1215	5.0	261		60 / 50 / 75-80	ca w chl. selv / lt. clay / calcite	2			
	1220	5.0	262		50	ca w chl selv, sealed	0			
W# ?, 1220.2-1221'	1225	5.0	263		40 / 70	clean / py, green lt. clay	3			
	1230	5.0	264		30 / 45	clean (contact) / clean (contact)	2			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____
LAT. ____ LONG. ____
DATE: START ____ COMPL. ____
LOGGED BY ____ DATE ____
BOX(ES) 162-168 RUN(S) 264-274

MINERALIZATION AND ALT. PRODUCTS: PYRITE, QUARTZ, CALCITE, FLUORITE, GYPSUM, MAG/HEM, OTHER

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE
See p. 26A for detailed description	1235		
	1240		
	1245		
1248 ± end of "sedimentary" section	1250		
These follows a long section of bleached, lt. gray tuff moderately welded, incomplete pumice random fragments matrix white – felds. phenos	1255		
v. numerous + ? coalesced no mafics, or v. rare	1260		
	1265		
characteristically pitted (felds)	1270		
little darker gray, "busier" felds. phenos → white clay	1275		
	1280		

HOLE NO. VC-2A
ATITUDE ____
NGITUDE ____
ELEVATION ____
INCLINATION ____
TOTAL DEPTH ____
CORE SIZE Hq

PROJECT ____ PAGE 26 OF 36
LOCATION ____ LOGGED BY ____

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

DATE ____
WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	HYDROLOGY: Drillers Comments Mud Tank	Waters, Gases
	1235	5.0	265	comp.		30 40 50 30 50	clean " dk gray clay " (pyrite)	5	hi med hi		
	1240	4.8	266			0-10	clean	1	hi		
	1245	5.0	267			30	lt clay	1			
W# 267-2, 1245-46'	1250	5.0	268	XX broken along bedding planes		30 50 40 30-50	pyr. p. mud, lithics clean pyr. p. mud, lithics pyr. sev. clay	7			
	1255	5.0	269	comp		20 60 35 50-70-80	clean grn. sev. clay " "	4			
	1260	5.0	270	comp, w/ tiny pitting, felds.		0-20	clean	1			
	1265	5.0	271					0			
W# 271-3, 1264.7-65.3	1270	5.0	272			20 70 60 80	clean tr clay clean gr clay	4			
	1275	5.0	273			10-20 20 60 50-70	clean " gr clay clean	6			
	1280	5.0	274	pitting more pronounced		0-10-20 10-20	" "	1			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______

LAT. ______ LONG. ______

DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 161 - 164 RUN(S) 263 - 268

Interesting interval blown up for more detailed descriptions 1225 - 1248'

DESCRIPTION	DEPTH	COHERENCY PROFILE	PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
contact 30-40° black fiamme, "gneissic" aspect	1225								
bleached matrix → gray	1230								
fiamme dk. gray, wavy, attenuated (30 to 1 ±) felds. phenos, frags. XL rich felds. argill.									
fiamme indistinct crowded w/ felds. phenos lt gray-green matrix 1234.5 wavy contact (~40°)	1235	frags. dk, pale green, pale pink (some)							
w/ densely fragmental tuff Agglomerate ∮ K lts to sub L lar frags. 1mm → ½". Pumice rare to none Matrix black → charcoal gray ? glass ? clast of densely welded tuff		 dk gray clay/silt.							
Repeat L lar frag. tuff as above, but frags. farther apart in gray tuffaceous matrix ? sandy section, random frags. rare fiamme lg frags again - pink, green, black	1240								
lt green matrix gray, bedded, 20°, 1mm white ? frags									
smaller fragments med. gray sugg. of bedding, 20°	1245								
pale green; appears to be tuff, not ss. v. fg. sk ? green pumice 20° 20° contact w/ tuff to follow									
1248 ± end of "sedimentary" section - apparently fall-out tuffs	1250								

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 168-174 RUN(S) 274-284

MINERALIZATION AND ALT. PRODUCTS: PYRITE | QUARTZ | CALCITE | FLUORITE | GYPSUM | MAG/HEM | OTHER

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE
tuff exactly as above bleached gray-white, pitted random lg frags. incrs pyr	1285		
matrix white argill. (but sl competent) XL rich pumices lg, deep gray, mod. compressed	1290		
frags. sparse	1295		
matrix white sericitic clay pervasive phyllic altn. abund. pyr cubes + pyritohedrons 1-3 mm, 5%	1300		
tr altered chlor. Conspic. pitting	1305		
only mod. welded less pitting	1310		
	1315		
med. gray, incrs. pits + vugs filled + pumices weathering out poor welding, lg clay pumices chlorite on	1320		
white argill. gmass, qtz bipyramids, pyr to mafic silvers	1325		
	1330		

HOLE NO. VC-2A PROJECT ____ PAGE 27 OF 36

ATTITUDE ____ LOCATION ____ LOGGED BY ____

LONGITUDE ____ DOWN HOLE SURVEY DATE ____

ELEVATION ____

INCLINATION ____

TOTAL DEPTH ____

CORE SIZE Hq

DEPTH	DECLINATION	AZIMUTH

WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters, Gases
				comp, w/ pits as above		40	py, lt. clay		hi		
	1285	5.0	275			20-30	clean	2			
W# 275-5, 1284.3-85.7'											
	1290	5.0	276			70	py, py mud	1			
	1295	5.0	277		XXX X1/4	20-25 80 40, 50	" clean chl. mud, slicks	8	med hi		
	1300	5.0	278			60° 10 20 30	sealed w CaKLS & white clay clean " "	3	hi		
	1305	5.0	279	fract. pitting broken "moth-eaten"		10 70 60 50 85-90	" py, lt clay chl mud clean lt clay	12+			
slicks	1310	5.0	280	comp		70 70 50 40-60	py mud " clean "	3			
W# 280-4, 1309.5-10.5'											
	1315	5.0	281	broken comp.	X	70 5-30 60 70	py, ca clean py clean	10	mod hi		
	1320	5.0	282	comp. but vuggy/ pitted		0-20 30 15 10 50 10-15 70	clean " " " chl. mud clean chl mud/py	4			
	1325	5.0	283			40 60 "	lt. clay " " " "	4			
	1330	5.0	284			5-20 60, 70 60 60 55	clean lt. clay " " " " py, py mud	7			

Lithologic Log

DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______

LAT. ______ LONG. ______

DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 174-180 RUN(S) 284-293

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
veggy grey tuff as above; lithic frags. ? pumice	1335									
more bleached	1340									
matrix white 'sericlay' but core still competent	1345									
1346-51 missing	1350									
pitted tuff as above; fragments increasingly conspic.; v. lg pumices such as 1 X 3", not compressed; feld. lg[illegible]pits	1355									
vugs replace qtz XLS; striated py cubes	1360									
	1365									
pitting decr to nearly 0	1370									
rather colorful frags + pumice in off-white matrix	1375									
	1380									

HOLE NO. VC-2A PROJECT ______

TITUDE ______ LOCATION ______ LOGGED BY ______

NGITUDE ______ DATE ______

ELEVATION ______

NCLINATION ______ WATER FIRST MET ______

OTAL DEPTH ______

CORE SIZE Hq

DOWN HOLE SURVEY: DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters. Gases
W #285-2, 1332.5-33.4'	1335	5.0	285			50; 10-30; 50; 60-80; 70	clean; lt. clay; py/ser mud; lt clay; " " + py	3	med. hi		
	1340	5.0	286	less veggy		75; 20-30; 20-35	py/ser mud; py, clean; " "	3			
	1345	5.0	287	veggy again		0-5; 40-70; 40; 70	" "; veggy/ca; " "; py/lt clay	5	hi		
here - 1346 crossed out + labelled 1351. ∴ lost 5' here?	1350					0-20	" " "				
W #288-1, 1351-51.8	1355	5.0	288	comp./pitted		50	clean	1			
	1360	5.0	289			80-90; 75; 30; 0-15	clean; lt clay; " "; clean	4			
	1365	5.0	290			30; 0-20	lt clay; clean	2			
	1370	5.0	291	comp.		10; 20	lt clay; "	2	med. hi		
W #292-2A, 1371.2-72.2'	1375	5.0	292			20	"	1			
	1380	5.0	293			70-90	clean	1			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE _____ AZIMUTH _____ C. ELEVATION _____ TD _____

LAT. _____ LONG. _____

DATE: START _____ COMPL. _____

LOGGED BY _____ DATE _____

BOX(ES) 180-186 RUN(S) 293-302

MINERALIZATION AND ALT. PRODUCTS: PYRITE | QUARTZ | CALCITE | FLUORITE | GYPSUM | MAG/HEM | OTHER

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE
vic 1382.5 change in aspect pumice more conspic, welded, w frayed ends, pale green but even more are gray-black, rhyolitic. To 1386' ±	1385		Detail of pumice (flattened)
lt gray matrix, v. little green alter. no longer argill rhyolite frags - charcoal gray green fiamme feldspars re-appearing, clayey	1390		
lg uncompressed pumice attenuated green fiamme	1395		
	1400		
occasional lg uncompressed pumice in densely welded tuff	1405		
lt gray rk w green fiamme py cubes rhyolite frags., altered	1410		
RENUMBERED	1405		
poss. rhyo. frags. matrix pale green/sericitic, soft so much so that rk has green aspect	1410		
green fiamme in lt gray rk continues XL rich	1415		
	1420		

HOLE NO. VC-2A PROJECT _____ PAGE 29 OF 36

LATITUDE _____ LOCATION _____ LOGGED BY _____

ONGITUDE _____

LEVATION _____

INCLINATION _____

TOTAL DEPTH _____

CORE SIZE Hq

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

DATE _____

WATER FIRST MET _____

COMMENTS	DEPTH	CORE RECOVERY	RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters, Gases
	1385	5.0	294	Comp.	/	60	lt. clay	1	med. hi		
	1390	5.0	295		~	20-30	lt clay/	1	hi		
W# 296-2,	1395	5.0	296		~ ~	20 0-15	clean " "	3			
	1400	5.0	297		~ /	10 40	" "	2			
	1405	5.0	298		~ | |	30 80 70-80-90	lt. clay lt. clay/ py "	2			
	1410	5.0	299	broken comp.	X / XXX} ~ XX	25 30-40 50-70	lt. clay " " " "	11			
"CORE FOOTAGE RENUMBERED TO MATCH DRILLERS"	1405				~	30	" "				
.: RUN 300-1406-1411	1410	5.0	300		\ = /	60-70 15 20-0 70-80	lt. clay/ py lt. clay py clean, py	5			
W 301-1A, 1411-12'	1415	5.0	301	X	~ F	20 10 65 10 10	clean, py " " " "	5			
	1420	5.0	302		~	20-60	lt. clay	2			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____
LAT. ____ LONG. ____
DATE: START ____ COMPL. ____
LOGGED BY ____ DATE ____
BOX(ES) 186-192 RUN(S) 302-312

ROCK TYPE | COHERENCY PROFILE | MINERALIZATION AND ALT. PRODUCTS: PYRITE, QUARTZ, CALCITE, FLUORITE, GYPSUM, MAG/HEM, OTHER

DESCRIPTION	DEPTH
welded tuff, slender green fiamme, conspic lithic fragments, XL rich becoming a tuff bx ? pale green clay in matrix feldspars as fill.	1425
incr. no. of frags - ? rhyo, ? andesite, green, brown, white ? p€ < lar to sub < lar can be identified when core is split	1430
frags to 5," all sizes make up 50-60% of sk "terrazzo" aspect	1435
v. lg frags. predom. 1436-38.5 constitute 75-80% of sk fiamme small + indistinct	1440
matrix green, frags often have green rinds @1438 banded rhyolite frag.	1445
frags 40-80% chlor/hem/py sk green aspect, green matrix like green turquoise!	1450
1452± now a fragmental tuff, frags 10-20% green fiamme small, abundant	1455
? poss. Abo SS. frag. cavities (absent qtz XLS) some qtz remaining	1460
frags smaller, 10%± green fiamme in green matrix prob. pumice lt. brown	1465
	1470

HOLE NO. VC-2A PROJECT ____ PAGE 30 OF 36
LATITUDE ____ LOCATION ____ LOGGED BY ____
LONGITUDE ____ DATE ____
ELEVATION ____
INCLINATION ____ WATER FIRST MET ____
TOTAL DEPTH ____
CORE SIZE Hq

DOWN HOLE SURVEY: DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters. Gases
W #303-1A, 1421-21.5'	1425	5.0	303	Comp.		30-40 15-35 20 30 10-40	lt. clay " " " " " " " "	6	mod. hi hi		
	1430	5.0	30.4			20 0-40 0-30-40	" " " " " "	3			
fractures jagged, go around lg fragments	1435	5.0	305			20 30 70	py, clean lt clay " "	3			
	1440	5.0	306			30 10-20-45 10-20 25	" " " " " " " "	4			
W #307-1A, 1441-42.5'	1445	5.0	307			10-15 10-40 60-90-10	" " " " py, "	3			
	1450	5.0	308			40 25	py py, slicks	1			
	1455	5.0	309					0	med. to hi (consequence of frags.)		
	1460	5.0	310			0	lt clay	1			
W #311-1A, 1461-62	1465	5.0	311			0-20 0-5	lt clay " "	3			
	1470	5.0	312			20 15-30	" " clean	4			

Lithologic Log

DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C ELEVATION ______ TD ______

LAT. ______ LONG. ______

DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 192-197 RUN(S) 312-324

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
green welded tuff w random frags. + slender green fiamme flow 30-40	1475									
deeper green + pitted, 1475.9 + after - to 1487.' felds. + some frags. "weathered" out Qtz cavities also	1480									
@1485 vn of Ca + qtz, w XLS lining vugs chlor banding, ? MoS₂	1485									
no. of frags. increasing, poss. to 25%, varied as above	1490									
qtz XLS indistinct, but there	1495									
green fiamme, green matrix	1500									
qtz bipy 7/0 ±, few cavities	1505									
fragments more numerous, + larger	1510									
	1515									
anhed. chlorite XL rich	1520									

HOLE NO. VC-2A PROJECT ______ PAGE 31 OF 36

LATITUDE ______ LOCATION ______ LOGGED BY ______

LONGITUDE ______ DATE ______

ELEVATION ______

INCLINATION ______ WATER FIRST MET ______

TOTAL DEPTH ______

CORE SIZE Hq

DOWN HOLE SURVEY: DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	HYDROLOGY: Drillers Comments Mud Tank	Waters. Gases
	1475	5.0	313	comp.		25 70 5-10 0-20	lt. clay clean lt. clay clean	2	hi		
end run 313 @ 1476 no 314 no 315 Run 316 = 1476-80	1480	4.0	316			0-15	clean	1	med. hi hi		
Run 317, 1480-86 W# 316 B, 1484-85	1485	6.0	317		X	10 60	lt. clay	10			
	1490	5.0	318	broken comp.	X X	20	" "	0			
W# 319-C, 1494-94'10"	1495	5.0	319					1			
	1500	5.0	320			0-5	clean	1			
	1505	5.0	321			50-10 80-90	clean "	1			
	1510	5.0	322					0			
	1515	5.0	323			20 10	clean "	5			
	1520	5.0	324			70, 10 10 20, 60 10 50-60	lt. clay clean " " lt. clay	6			

Lithologic Log

DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______

LAT. ______ LONG. ______

DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 198-204 RUN(S) 324-334

MINERALIZATION AND ALT. PRODUCTS: PYRITE | QUARTZ | CALCITE | FLUORITE | GYPSUM | MAG/HEM | OTHER

ROCK TYPE | COHERENCY PROFILE

DESCRIPTION	DEPTH
welded tuff, fragmental green fiamme, green matrix random frags - 10-20% XL rich, some qtz cavities matrix somewhat argill.'	1525
	1530
	1535
some fiamme not as densely welded	1540
	1545
incr. in lithics ∠lar, sub∠lar, rounded	1550
abund. qtz XLS + shards + grains matrix argill. but core competent	1555
lighter green	1560
decr. lithic frags., 10% or less fiamme indistinct 1564-64.5 brown frags. conspic., 15% v. fg tuff	1565
peculiar "bedding" @ 1565.5 ? welded pumice train again @ 1567.5 (30°) few gr fiamme ? mylonite	1570

gray fragm. tuff - matrix v. fg, sil., w 10% pyf costs 4 feldsp. ghosts. No qtz. 1 pc frag. - ? dolerite. No fiamme but few lg pumices

HOLE NO. VC-2A PROJECT ______ PAGE 32 OF 36

LATITUDE ______ LOCATION ______ LOGGED BY ______

LONGITUDE ______ DATE ______

ELEVATION ______

INCLINATION ______ WATER FIRST MET ______

TOTAL DEPTH ______

CORE SIZE Hq

DOWN HOLE SURVEY: DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters. Gases
W# 325-B, 1521.7-22.3±	1525	5.0	325	comp.		10, 0-20, 0-10, 20	clean, ", ", "	5	hi		
	1530	5.0	326	comp. but broken every 5-8"±		0-20, 5, 20, 15, 5-20, 15	lt. clay, clean, ", lt. clay, clean, ", lt. clay	8			
	1535	5.0	327			10-15, 0-25, 30, 10, 15	clean, ", ", ", "	5			
	1540	5.0	328			10, 15, 20, 10-15, 10	", ", ", ", "	7			
	1545	5.0	329			0-25, 10, 5-30, 60, 5, 60	", ", ", lt. clay, slicks, clean, clay, Ca	10			
	1550	5.0	330			10-25, 0-20, 5-15, ", 20	clean, ", ", ", lt. clay	12			
	1555	5.0	331			10, 15, 70-80, 10, 40, 5-20	clean, ", ", lt. clay, " ", tr calcite, clean	14			
	1560	5.0	332			15, 40-50, 10, 20, ", 10	lt. clay, clean, lt. clay, clean, ", "	10			
	1565	5.0	333			20, 10-20, ", ", 70, 20	lt. clay, clean, ", ", ", "	12	med. hi		
@1566.5, ? bogus clay, 3" pale green	1570	5.0	334			0-20, 0-5, 40, 40-50, 0-30, 0-20	", lt. clay, clay, slicks, py mud, slicks, clean, "	9			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C. ELEVATION ______ TD ______

LAT. ______ LONG. ______

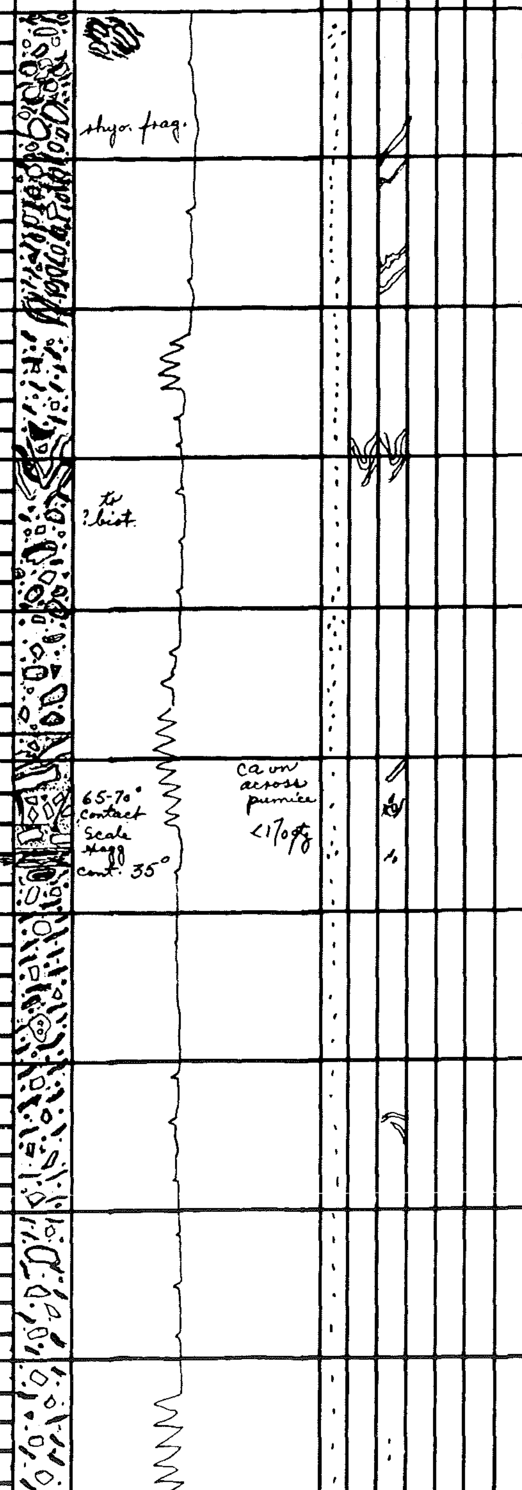
DATE: START ______ COMPL. ______

LOGGED BY ______ DATE ______

BOX(ES) 204-210 RUN(S) 334-344

DESCRIPTION	DEPTH
many frags green (pale), rounded; abund. chlorite, ser, py; No qtz; ? mylonite	1575
rare lithics; oval "augen"; dk v. green, w green fiamme	1580
matrix green, hard, grainy, silic. No qtz phenos, ghosty felds. tr biot? @1585 mylonite? 5"± not welded	1585
somewhat argill, no qtz; 1587 begin non-welded tuff; lithics rare, but numerous lt. green slightly compressed pumices; fiamme v. small, inconspic	1590
no qtz; @1594 bleached; green matrix w lg pale green pumice, unwelded, crowded; 1 qtz XL	1595
rare frags. 1596-96.4, ? Intrusion bx. Llar lithic frags in green clay + calcite; (per JG + FG →) ? cataclastic ss/sh 1597-97.7, green-brown; green fragmental welded tuff; green fiamme in gr. matrix, qtz	1600
(VS →) or fault gouge material/shear?; 0-1% qtz	1605
occ. larger un-compressed pumice; qtz + cavities 3-5% inconspic.	1610
some lg pumice escaped welding; no qtz, but some Si in matrix; tr qtz, no bipy's	1615
	1620

ROCK TYPE / COHERENCY PROFILE / MINERALIZATION AND ALT. PRODUCTS (PYRITE, QUARTZ, CALCITE, FLUORITE, GYPSUM, MAG/HEM, OTHER):



HOLE NO. VC-2A PROJECT ______ PAGE 33 OF 36

LATITUDE ______ LOCATION ______ LOGGED BY ______

LONGITUDE ______ DATE ______

ELEVATION ______

INCLINATION ______ WATER FIRST MET ______

TOTAL DEPTH ______

CORE SIZE Hq

DOWN HOLE SURVEY DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	RUN	Weathering Alteration	Faults/ Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	Drillers Comments Mud Tank	Waters. Gases
	1575	5.0	335	Comp.		20; 40; 10-30; 0-15	clean; chlorite, lt Ca; clean; "	3	hi		
mislabel?? ↓	1580	5.0	336			15-20; 40-70; 20	"; chlor, Ca, py; clean	3			
W #334 D, 1570' ??	1585	5.0	337	broken; comp. but freq. fr.		60; 70; 40-50; 50; 25	chlor, py, py mud, slicks; lt Ca, clay; Ca; Ca; clean	12+			
	1590	5.0	338			15; 5; 50; 55; 80; 70; 10	"; chlor, py, ser slicks; clean; chlor, py, ser, tr Ca; clean	4			
	1595	5.0	339	broken		80; 10; 50-90; 70	clay, ca, slicks; clean; chlor, clay; chlor, ser	12+			
	1600	5.0	340	comp. but freq. fr.		50; "; 40; 50	chlor; ca; ca, chlor; " "	10+			
W #340-F, 1600.5-1601'	1605	5.0	341	comp.		15; 10; 5-20; 5; 70; 10	clean; "; "; "; chlor; clean	4			
	1610	5.0	342			50; 40-50; 10; 5-20; 0-5	chlor; py, clay, ca; clean; "; lt. clay	7			
	1615	5.0	343			10; 0-15; 0-20; 5	clean; clean; "; "	7	hi to med. hi		
W 343-J, "1609" incorrect; lies at 1615.4-.9±	1620	5.0	344	broken		0-10; 30; 70-90; 60; 60-70	"; py mud, slicks; clean; lt. clay, Ca	12+			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ______ AZIMUTH ______ C ELEVATION ______ TD ______
LAT. ______ LONG. ______
DATE: START ______ COMPL. ______
LOGGED BY ______ DATE ______
BOX(ES) 210-216 RUN(S) 344-354

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	MINERALIZATION AND ALT. PRODUCTS (PYRITE, QUARTZ, CALCITE, FLUORITE, GYPSUM, MAG/HEM, OTHER)
green welded tuff, fine fiamme, few fragments; conspic anhed. chlorite; no qtz	1625			
? mylonite	1630			
more frags. 1633* non-welded, green, rare frags. lt. green sh, v. lt green pumice; no qtz, but Si in gmass	1635		qtz 5% contact 40°	
shear; 1636 - mod. welded fragm. tuff; frags. to 35%, red, brown, black, gray; lt. green matrix	1640		40°	
qtz to 5%, gmass somewhat argill.; qtz to 10%.	1645			
few fiamme, mod. → dense weld.	1650			
qtz-rich	1655			
py sparse	1660			
	1665			
	1670			

HOLE NO. VC-2A PROJECT ______ PAGE 34 OF 36
LATITUDE ______ LOCATION ______ LOGGED BY ______
LONGITUDE ______ DATE ______
ELEVATION ______
INCLINATION ______ WATER FIRST MET ______
TOTAL DEPTH ______
CORE SIZE Hq

DOWN HOLE SURVEY: DEPTH	DECLINATION	AZIMUTH

COMMENTS	DEPTH	CORE RECOVERY	RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	DIP	Infilling	Fracture Frequency	Porosity	HYDROLOGY: Drillers Comments Mud Tank	Waters. Gases
	1625	5.0	345	comp.		60, 30, ", 50-60, 25, 30,50	sert. clay, py, py mud; py mud; "; clay, Ca; clean; clay, Ca	11	hi		
	1630	5.0	346			60	gr clay, py mud py	0			
W #347-1, 1631-31.5 (wrong footage on sk)	1635	5.0	347			5-10, 0-40	clean; gr. clay	6			
	1640	5.0	348	broken comp.		20, 40, 75, 25, 0-10	"; "; " +py m.; clean	1	med.; hi		
	1645	5.0	349			0-15, 35, 0-15, 60	clean; clay, Ca; clean; slicks	5			
	1650	5.0	350			0-30	clean	0			
W #351-1, 1651-52.2'	1655	5.0	351			40, 10-15, 70	clean; "; lt. clay	3			
	1660	5.0	352			0-20	lt. clay	2			
	1665	5.0	353			15, 0-5	clean; lt. clay	1			
	1670	5.0	354			80, 10,40	sealed; clean	2			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C. ELEVATION ____ TD ____

LAT. ____ LONG. ____

DATE: START ____ COMPL. ____

LOGGED BY ____ DATE ____

BOX(ES) 216-222 RUN(S) 354-364

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
conspicuously fragmental mod. → densely welded green, wgty as above	1675									
	1680									
	1685									
	1690									
#10. RUTILE - TITANIUM OXIDE Calcite XLS/ druses, w tiny mafics over entire surface (A in clusters A)	1695									
also yellow min = #9 Zn SULFIDE, PROB. SPHALERITE pumice welded, small, occ. larger ones mod. welded incrm. frags, generally small, L lar + sub L lar	1700									
pumice rarely attenuated Continues to contain qtz XLS + shards anhed. chlorite green slightly argill. matrix	1705									
	1710									
@ 1712.5, ¾" vn of Calcite XLS, 70°, in one portion a bt, w frags in Ca 2 tr bio + 8% ±	1715									
frags larger + more incrm. - to 30% megascopically	1720									

HOLE NO. VC-2A PROJECT ____ PAGE 35 OF 36

LATITUDE ____ LOCATION ____ LOGGED BY ____

LONGITUDE ____

ELEVATION ____

INCLINATION ____

TOTAL DEPTH ____

CORE SIZE Hq

DOWN HOLE SURVEY

DEPTH	DECLINATION	AZIMUTH

DATE ____

WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/ Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters. Gases
W# 355-1, 1671-71.6'				comp.					hi		
	1675	5.0	355		—	0-10	clean	2			
	1680	5.0	356		~	5-15	lt. clay	0			
	1685	5.0	357		~	5-20	clean	2			
	1690	5.0	358		~	20 15	clean clean	2			
W# 359-1, 1691-92.2	1695	5.0	359		~	0-5 10 15 20 50 10	" clean " " gr. clay clean	7			
	1700	5.0	360		~	70-90 20	" "	1			
	1705	5.0	361		~	0-10 5-20 35 25	clean " lt. clay + slicks " "	3			
	1710	5.0	362		~	25	" "	2			
W# 363-1, 1711-12'	1715	5.0	363		~	0-15 X 15 X 70 10 70 15	" " clean lt. clay " " + slicks lt. cl.	8			
	1720	5.0	364		~	25	clean	1			

Lithologic Log

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DRILL HOLE VC-2A ATTITUDE ____ AZIMUTH ____ C ELEVATION ____ TD 1731'
LAT. ____ LONG. ____
DATE: START ____ COMPL. ____
LOGGED BY VLS DATE -10/29/86
BOX(ES) 222-224 RUN(S) 364-366

DESCRIPTION	DEPTH	ROCK TYPE	COHERENCY PROFILE	MINERALIZATION AND ALT. PRODUCTS: PYRITE	QUARTZ	CALCITE	FLUORITE	GYPSUM	MAG/HEM	OTHER
green fragm. tuff as above all sizes frag's pumice present, not conspic., small Zty still present	1725			·					·	
@1730.2 ± lg frag. (2") of	1730			·					·	
? biot andesite. lt. brown w bleached annole	1731' T.D.			·					·	

HOLE NO. VC-2A PROJECT ____ PAGE 36 OF 36
LATITUDE ____ LOCATION ____ LOGGED BY VLS
LONGITUDE ____ DOWN HOLE SURVEY DATE -10/29/86
ELEVATION ____
INCLINATION ____
TOTAL DEPTH 1731'
CORE SIZE Hq

DEPTH	DECLINATION	AZIMUTH

WATER FIRST MET ____

COMMENTS	DEPTH	CORE RECOVERY	ROCK: RUN	ROCK: Weathering Alteration	STRUCTURE: Faults/Shatter Zones	STRUCTURE: DIP	STRUCTURE: Infilling	STRUCTURE: Fracture Frequency	STRUCTURE: Porosity	HYDROLOGY: Drillers Comments Mud Tank	HYDROLOGY: Waters, Gases
				comp'	—	5-15	lt. clay + slight clean		hi		
					—	10	"				
		6.0	365		~	10	"	4			
	1725				~	5-10	"				
					—	5	"				
W #366-E, 1729.3 - 30.15	1730	4.0	366		~	5-10	"	1			
	1731 T.D.										