BEDROCK FIELD LOG SHEET

PROJECT: NCZGMRS	**DRILLING METHOD:**
BORING ID: CH-3	Wireline Coring
LOGGED BY: S. Wang and C. Greene	**CORE DIAMETER:** 2.5"
BEGIN DATE: August 15, 2006	**LAT:** 35 37 12.266
END DATE: October 4, 2006	**LONG:** 79 45 27.404

LITHOLOGIC DESCRIPTION			FRACTURE INFO				
INTERVAL	* RECOVERY	DESCRIPTION * ' = foot/feet; " = inch/inches ** Dip Angle: V = Vertical, SV = Sub-vertical, M = Medium, SH = Sub-horizontal, H = Horizontal Rock names used in description: Tuff = weakly metamorphosed felsic tuff; lapilli tuff = weakly metamorphosed lapilli tuff	** DIP ANGLE	# ANNEALED	# OPEN	H2O BEARING	MINERALS
51	4'3"	Lithic lapilli tuff, light medium gray, slightly welded, porphyritic texture formed by lithic fragments, white lapilli-sized pumice and dark fiamme clasts scattered in the groundmass, slightly foliated with faint eutaxitic texture. Fe and Mn leaching stain on surfaces of all open fracture planes. Apparently dip of 30 -75 degrees to different directions. At the base of the run, uneven Fe & Mn leaching stain gives core pseudo-breccia appearance (photographed). Water bearing.	V	1			Secondary mineral: hematite
TO			SV	3	1	Y	
			M		1	Y	
			SH		1	Y	
55			H				
55	5'7"	Lithic lapilli tuff, light medium gray, more weathered and affected by fractures than above. Top 7" of core from previous run. Rock fragments inlaid in irregular partition lines and colors caused from uneven Fe leaching (photographed) or weathering. Slaty shearing zone from 55' to 56'5", foliation partings with an apparent dip angle of 74 degrees. Pseudo-breccia or breccia tuff at 57'8"-58'4". Finer and brittle tuff with weak eutaxitic texture at end of run. Water bearing.	V	2			Hematite
TO			SV	2	4	Y	
			M		2	Y	
			SH				
60			H				
60	5'	Tuff, light medium gray, accretionary lapilli common. 3.5" thick fault at 61'2"-61'.6", apparently dipping at 75 degrees. The fractured zone resulted from conjugate shearing fractures. Kaolinization and Fe leaching occurred in the fracture zone probably due to both deformation and groundwater activities. Water bearing.	V	2	1	Y	Kaolinite
TO			SV	1	2	Y	
			M		4	?	
			SH				
65			H				
65	5'8"	Lapilli tuff to coarse tuff, light medium gray. Altered, dense and very competent. Two fracture zones, each 8" thick, at 68' and 69'6", respectively. Water bearing.	V		2		
TO			SV	2	2		
			M	3	3	Y	
70			SH	1			
70			H				

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70	4'8.5"	Lapilli tuff, greenish gray, massive to weakly foliated, some eutaxitic texture visible, and moderately welded; weak foliation reflected by slightly flattened lapilli-sized clasts of pumice and other lithic fragments. Apparent dip of flow bands or foliation is approximately 75-80 degrees, while at upperpart of the core is less steep, about 60-65 degrees. Fractures with a high angle of dipping almost parallel to the apparent flow banding or foliation. A set of conjugate joints at 70'6". Fe leaching stain along all	V	1			Hematite and sericite
TO			SV		1		
			M	1	5		
			SH		5	Y	
75			H				
75	5'6"	Lapilli tuff, color change from light gray to brown gray at 78' due to Fe leaching and kaolinization, then becoming greenish gray at 79'6". Some vesicles filled with accretionary lapilli of pumice clasts or feldspar grains, giving the rock from 75' to 75'6" and 76'6" to 78' a porphyritic appearance. Groundmass weathered, finer and less lapilli-sized pumice and/or feldspar clasts toward the end of the run. Sericite and biotite present. Water bearing from 78'6" to 79'6". Sampled at 78'. This run is relatively soft, less dense, with vesicles present.	V	2			Feldspar, sericite, and biotite
TO			SV		2		
			M		2	Y	
			SH		2		
80			H	1			
80	5'4"	High angle fault, 70-75 degrees at top of the run, fault gouge present. Appears water bearing. Then volcanic lithic-rich breccia (two types of lithic fragments: greenish tuff and light gray lapilli lithic tuff) to 81'4". Then, texture becomes massive with some vesicles, most of them filled with lithic clasts or feldspar crystal or crystal fragments that increase in frequency with depth. From 82'6" to the base of the run, rock is less altered (or fresher). Porphyritic texture at the end of the run.	V	1			Feldspar
TO			SV	1	5		
			M	1	4	Y	
			SH		1		
85			H				
85	5'	Lapilli tuff, light gray, lithologic character similar to last run, but more massive and more porphyritic texture appearance. Lithic clasts and feldspar crystal clasts (0.1 to 0.15") scattered in finer tuff groundmass. At 84', fractured massive tuff. From 84' to 85', softer, less dense and less competent.	V	1	1		Feldspar
TO			SV	3	1		
			M	2	2		
			SH	3			
90			H				

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90	4'7"	Lapilli tuff to tuff, greenish gray, vesicular. Fe leaching stain along fracture surfaces, indicating a water bearing zone, but no circulated water loss during coring, so not a major water producing zone.	V	2			
TO			SV		1		
			M		3	Y	
			SH		3	Y	
95			H				
95	4'2"	A two-inch thick discolored hydrothermal altered layer of vesicular lapilli tuff found at the top of the run, then followed by lapilli tuff, light gray, very competent and dense, suggesting compressional strain and/or hydrothermal alteration or metamorphism (silicification and re-microcrystallization. The core was mechanically broken at 98' 4.5"; the bottom foot was not captured from	V				
TO			SV	1			
			M		2	N	
			SH		1	N	
100			H				
100	5'11"	Lapilli tuff, light gray, lithology similar to above, but lithic clasts coarser, not well sorted, and consisting of both light colored pumice clasts and dark volcanic glass shards or fragments. Mean size of lithic clasts or fragments larger than 0.1". Some irregular lines/veinlets of light colored minerals on the surface of core. Fe leaching stain along the surfaces of open fractures. Water bearing.	V				Feldspar and biotite?
TO			SV	5			
			M		1	Y	
			SH		1	Y	
105			H				
105	5'6.5"	Tuff, light gray, very dense and possibly recrystallized, both feldspar clasts and lithic fragments present. Weakly welded and foliated, microcrystallization or devitrification appears to have occurred in groundmass. Slight flow-band feature suggests almost vertical bedding. Very few open fractures, but multi-directional parting/annealed fractures present and filled with white colored minerals that may be from siliceous-calcium rich hydrothermal activities.	V	1			possible quartz, feldspar and biotite
TO			SV	2	1		
			M	4			
			SH	3			
110			H				
110	6'4"	Crystal tuff, light gray, massive to granular texture. Very dense and competent (coring sands used to advance core). The core was very difficult capture or to be broken and pulled up. It took more than 2 hours to complete the run, suggesting the rock has been significantly silicified and/or crystallized, and fresh. Fracture pattern is similar to the pattern in the last run.	V				same as above, but plagioclases possible
TO			SV	6			
			M	9			
			SH				
115			H		3	N	

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115	3'11"	Crystal lapilli tuff, light gray, very competent, and probably altered. Lapilli-sized lithic clasts and smaller crystals and fragments of crystals of feldspar common. Fresh broken surface of the rock appears to be fine granular, but still massive and slightly foliated. Clasts of lithics or minerals have very sharp edges. Apparent dip of sealed fractures ranges from sub-vertical to almost vertical. Two to three mechanically broken fractures noted in this run.	V	2			Possibly quartz, mica/sericite, biotite & feldspar
TO			SV	5			
			M				
			SH				
120			H				
120	4'11"	Lapilli tuff, gray, massive and dense. Both rounded and angular tuff or tuffaceous rock clasts present in the finer groundmass. Many small (0.05" to 0.08" thick) irregular light colored veinlets on the core sample. Fe leaching stain on fractures. Sealed fractures/partings very well developed, but probably not water bearing. Sampled at 120'	V				same as above
TO			SV	2			
			M	9			
			SH		2	N	
125			H				
125	5'3"	Lithic lapilli tuff, gray, weakly welded, intersected by a discolored fault (6" in apparent thickness) at 126'2" and characterized by fault gouge, or complete weathered rock (soft but with relict texture). Highly sheared but no displacement until the end of the run; very slaty and brittle. Apparent dip of the fractured zone is about 65-70 degrees. Rock in this run less competent than last few runs. Fe and Mn leaching stain along fractures. Water	V				
TO			SV		1	Y	
			M		5	Y	
			SH				
130			H		2	Y	
130	4'3"	Lapilli tuff, gray to light gray, slightly welded and foliated. Grain size of lithic clasts generally smaller than 0.05" to 0.08" but some fragments larger than 0.8". Foliation defined by slightly flattened pumice and fiamme clasts, locally pseudo-volcanic breccia. A set of conjugate joints, one group with an 80 degrees dip angle, almost parallel to foliation, and the other intersecting the foliation with a small angle. Appears to be water bearing.	V				
TO			SV	3	2	Y	
			M	4	1	Y	
			SH				
135			H				

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135	4'3"	Tuff, gray to light gray, massive to moderately foliated, welded, altered, very brittle. Calcium deposited on fracture planes, suggesting later hydrothermal activity. Fractures apparently dip 65-70 degrees. Many small and thin white veinlets (irregular partition lines) on the surface of the core. Does not appear to be water bearing. 17 minutes to compete the run.	V				Calcite
TO			SV	3			
			M	7	1	N	
			SH				
140			H				
140	5'	Tuff, gray to light gray, similar to last run, altered and possibly microcrystallized. Foliation or flow banding apparently dips 60-65 degrees. Heavy Fe and Mn leaching stain on surfaces of fracture planes, indicating water effects.	V				sericite, calcite
TO			SV				
			M	5			
			SH		2	Y	
145			H				
145	5'	Tuff, light gray to gray, lithology similar to last run, welded, altered, brittle and microcrystallized. Apparent flow bands dipping approximately 63 degrees. Several foliation partings dipping in different directions, intersecting each other at almost right angle. Not a water-bearing zone.	V				
TO			SV	5		N	
			M				
			SH				
150			H				
150	5'	Tuff, light gray to gray, lithology similar to last run, welded and altered, very brittle. Many parallel foliation partings, slightly open when intersected by another set of joints or partings. Not water bearing.	V				
TO			SV				
			M	10	2	N	
			SH				
155			H				
155	5'7.5"	Tuff, light gray to gray, lithology similar to last run, welded and altered, brittle, more fractured. Fe and Mn leaching stain on surfaces of fractures at the lower portion of the run, from 157'6" to 160'. A 0.5" scale open fractures appear to be water-bearing.	V				
TO			SV	5	4	Y	
			M	3	1	Y	
			SH				
160			H				

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160	5'1"	Tuff, light gray to gray, lithology similar to ast run, welded, altered, slaty. Top 3' is highly fractured. At 161' to 161'6", a small fault evidenced by weathered soft rock in the opening; appeared to be water bearing. Most fractures parallel to flow banding or foliation defined by aligned small white colored pumice fragments and dark fiammes.	V				
TO			SV				
			M	6	3	Y	
			SH				
165			H				
165	4'8"	Tuff, slightly greeninsh gray, weakly welded and foliated. Two groups of fractures noted, major features without displacement and parallel to flow banding or foliation. The less developed group intersects the foliation or flow banding dipping at 70 to 80 degrees. Fe leaching stain on slightly open fracture planes. Sampled at 169'.	V				
TO			SV				
			M	8	2	Y	
			SH	1			
170			H				
170	5'3"	Lapilli tuff to tuff, gray, very dense and welded, with sub-conchoidal fresh broken surface. Locally exhibits eutaxitic texture. Several almost vertical annealed fractures. Few slightly open fractures with medium dip angles. No water. The hole was terminated at 175'.	V	5			
TO			SV				
			M		3	N	
			SH				
175			H				