

BEDROCK FIELD LOG SHEET								
PROJECT: NCZGMRS				DRILLING METHOD:				
BORING ID: CH-1				Wireline Coring				
LOGGED BY: S. Wang and C. Greene				CORE DIAMETER: 2.5"				
BEGIN DATE: June 26, 2006				LAT: 35 37 04.621				
END DATE: July 25, 2006				LONG: 79 45 11.731				
LITHOLOGIC DESCRIPTION				FRACTURE INFO				
I N T E R V A L	* R E C O V E R Y	DESCRIPTION	* * D I P A N G L E	# A N N E A L E D	# O P E N	H 2 O B E A R I N G	M I N E R A L S	
								' = 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								
30	T O	3'2'	Lapilli tuff, light to medium gray, silt- to sand-sized volcanic rock fragments with scattered quartz and feldspar grains. Rock fragments or pumice clasts larger than 0.15" scattered in groundmass. Feldspars partially altered to clay minerals. Massive with minor foliation. Apparent dip of fractures range from vertical at top of the run, 45-70 degrees in the middle, to horizontal at the bottom. Minor Fe leaching along scattered fractures. Calcite observed along a fracture at 34.6'.	V		1	Y	Feldspars, biotite (possible), and quartz; secondary mineral: calcium
				SV		1	Y	
				M	1	2	Y	
				SH				
35				H		1	Y	
35	T O	4'11"	Lapilli tuff, gray, angular to sub-rounded lithic and pumice clasts, and mineral grains including feldspar, quartz, and biotite, scattered in groundmass devitrified or partially recrystallized. Massive to very weakly foliated and altered. At top of the run, the rock is more fractured. In the lower portion of the run, two horizontal and one medium angle (40 degrees) fracture stained by Fe leaching. Minor evidence of flattened vesicles with Fe stained interiors. Minor water circulation loss at 35.4'.	V				Same as above
				SV		1	Y	
				M		1	Y	
				SH				
40				H		2	Y	
40	T O	5'	Lapilli tuff, gray, felsic. Mineral composition and texture as above. Fractures dip at two different directions with apparent dips of 25-30 degrees and 75 degrees, respectively, and intersect each other. Fe-Mn leaching stain on the surfaces of the slightly open fractures at 42' 6", possibly water bearing because of loss of water circulated during coring.	V				Same as above
				SV		1		
				M		4	Y	
				SH		1		
45				H				
45	T O	5'2"	Lapilli tuff, gray, dense, massive to porphyritic texture. Porphyritic texture gradually disappears with depth. Fractures with medium dip (40 - 45 degrees) at the end of the run. Minor evidence of incipient welding (flattened amygdules) at 48.8'-49.2'. Fe leaching stain at 49.9'.	V				Same as above
				SV				
				M		3	?	
				SH				
50				H				

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50	5'1"	Lapilli tuff, lithic, gray, with coarse rock fragments, some irregular white and fine/aphanitic veinlets (composed of siliceous and clay minerals) on the cylinder surface of the core. Massive, very dense, some welded and foliated, but high angle and very brittle fractures at 50.9-53.0' and silicification found at 52.7'. Fractures sealed with secondary minerals from hydrothermal alterations in this run; minor Fe leaching stain at 55.0'.	V				Same as above
T O			SV		2	N	
			M				
55			SH				
			H				
55	4' 9.5"	Lapilli tuff, gray, from 55' to 58.9', overlying more altered slaty/cherty tuff. A slickenside with 60-degree apparent dip and green to blue color at the top of the run. Very smooth (chlorite, epidote, and micas apparently present) on the other side of the fracture; multiple centimeter-scale fractures with calcite at 58.9'; then core becomes light gray-yellowish gray color and fine grained texture. Streaky inclusions in silicified groundmass, cataclastic texture at 59.0-59.5'.	V				also chlorite, epidote and micas
T O			SV		4	Y	
			M				
60			SH				
			H				
60	5'	Tuff, light gray, coarse to 64'; underlain by angular to sub-rounded lithic lapilli tuff and tuff breccia, light gray; highly fractured. A set of slightly open and conjugate fractures at 61'-62', gouge(?)/breccia (muddy due to groundwater in the fractures). At 62.5', calcite lined a fracture with an apparent dip of 70 degrees. Larger (1-1.5") angular lithic clasts and breccia observed with cataclastic texture at 65' (photographed).	V				Secondary calcite
T O			SV		4	Y	
			M				
65			SH		2	Y	
			H				

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65	5'	Lithology change. A pale green gouge zone observed at the beginning of the run; multiple fractures (stockwork appearance) with brecciated fragments at 65.0-65.3' and 66.5-66.9'. Angular rock fragments and pumice clasts (0.25" to 1.2") cemented in a tuffaceous groundmass. Fractures apparently dipping 43-69 degrees. At 66.0', an open fracture appears to bear water. Also several fractures with medium or slightly vertical dip angles observed in this core run. Calcite coating observed along fractures.	V				Secondary calcite
			SV		3	Y	
			M		2	?	
			SH				
70			H				
70	4'11"	Possible tuff, darker gray, altered. Texture getting finer and phyllitic, some evidence of flow fabrics. Groundmass appears to be microcrystallized or devitrified. Significant horizontal fracture offsets at 70.5'; possible plagioclase, secondary calcite filling in fractures at 72.3'. Lithology seems to be mafic, so sampled at 72.5 feet. Partings or cleavages parallel to apparent flow banding or foliation (dipping 67degrees). Gouge zone (mud/angular gravels: 50/50) from 74.8' to bottom of the run. Water bearing.	V		1	Y	Feldspar and possible biotite, secondary calcite
			SV		1	Y	
			M				
			SH		2	Y	
75			H		1	Y	
75	5'	Tuff, gray, altered, fine and massive. Fractures are more slaty/phyllitic, but generally less fractured than the last core run. Only three high angle (sealed to slightly opened) fractures. Calcite on the planes of the fractures, pyrite also found on a fracture plane at 77.0-78.0'. Flattened lithic clasts sub-parallel to partings. Lithology appears to revert to felsic tuff along a fracture beginning at 75.5' (dipping 58 degrees). Occasional pumice clasts (average 0.75" x 0.75") observed in the groundmass.	V				Calcite, clay minerals, & pyrite
			SV		3	N	
			M				
			SH				
80			H				

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80	5'9"	Tuff to lapilli tuff, gray. Very fresh and dense/compacted, massive and welded, with occasional micro-crystallization or silicification in groundmass. In this core run, only one slightly open (no displacement) fracture with 53 degrees of apparent dip. Weathered surface observed at 85.8'. Recovery rate is good. 9 additional inches of core sample were from the previous core run.	V				Quartz ?
T O			SV				
			M		1	N	
85			SH				
85	5'2"	Lapilli tuff, gray, welded. Very similar to last run, very densely compacted, very competent. Very few fractures. Minor weathering at 85' - 85' 9". Minerals could not be identified in the field.	V				
T O			SV				
			M		1	N	
90			SH				
90	4'10.5"	Lapilli tuff, gray, massive. Lithologic characteristics similar to the last two core runs except that the rock texture is finer. Medium to medium-high angle fracture/parting sets observed, but no displacement. Minerals could not be identified in the field.	V				
T O			SV		1	N	
			M		2	N	
95			SH				
95	5'6"	Lapilli tuff, gray, fine to coarse. Well welded with more pyroclastic characteristics observed. Very competent (the run took 40 minutes to complete) and slightly foliated near fracture planes. Almost no fractures observed in the top two feet, but shearing prevalent, with attending sheared clasts/fragments. Fractured at 98 - 99', with scattered kaolinization on fracture planes. A 0.5" scale slickensided fault observed at 100'. Water bearing.	V				Secondary minerals: Kaolinite & chlorite
T O			SV				
			M		3	Y	
100			SH				
			H				

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100	4'2"	Lapilli tuff, gray. Size of lithic clasts or fragments ranges from small to large, angular shaped lapilli. At 102', an inch-wide zone of intense foliation partings was noted. Below this zone, the shape and size of clasts became sub-rounded, smaller, and more uniform.	V				
T O			SV				
			M		1	N	
105			SH		2	?	
			H				
105	6'5"	Tuff, light gray. A slickenside with an apparent dip of approximately 40 degrees noted at the top of this run. Next fractured interval at 108', a set of conjugate shearing partings at 108.4'-108.8', fractures at 109'-110' (three slightly open and one annealed); secondary minerals including chlorite and other hydrated silicates on fracture surfaces. Fractured partings prevalent with apparent dip of 51 degrees. Clasts aligned along the prevailing foliation.	V				Secondary minerals: Chlorite and other hydrated silicates.
T O			SV		1	N	
			M		4	?	
110			SH				
			H				
110	5'3"	Tuff, gray, coarse, but welded. Massive to slightly foliated (flatted dark fiamme clasts linearly oriented). Fracture planes generally parallel to the foliation or flow banding, apparently dip approximately 50 degrees. Occasional clasts approximate 0.75" in diameter longitudinally tapered at 113.8-114.4'. An accessory lithic pyroclast (?).	V				
T O			SV				
			M		2	?	
115			SH				
			H				
115	3'11"	Tuff, gray, moderately welded and foliated, very compact and dense. Stretched lithic fragments aligned along foliation, less fractured. Pyrite and calcite on the surface of a fracture at the top of the run. Irregular white color mineral veinlets observed on surface of the core. Sealed linear fractures either parallel to the flow bands/foliation/bedding, or crossing them with a very low angle (less than 10 degrees). The fractured zones very brittle, as exhibited by the hackly appearance of the fractures.	V				Pyrite and calcite
T O			SV				
			M		3	N	
120			SH		1	N	
			H				

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120	6'4"	Tuff, gray, welded and microcrystallized. Very fine grained hornfelsic texture at 120'10". Weak foliations marked by relatively linear oriented flattened pumice clasts, apparent dipping of 60 degrees. Quartz and biotite appear to be present. Airfall and flow deposit interlayered, stratification modified by creep, foliation dipping at 55-65 degrees measured at 121'. White irregular veinlets of secondary minerals observed on the surface of the core. Within this run two horizontal fractures and one sub-horizontal small fracture observed, slightly open or sealed with calcite.	V				Quartz and biotite; secondary calcite		
			SV						
			M						
			SH		1	N			
125			H		2	N			
125	5'	Lithic lapilli tuff, gray, dense, massive to moderately foliated. Between 125' 7" and 126' 6", lighter in color, and very slaty, dark flattened and stretched fiamme clasts constitute the flow bands and foliations dipping approximately 53 - 55 degrees. The slaty unit ended at a shear fracture filled with calcite at 125'5" -125'11". A group of intersected fractures at 128'4"-129', one of them slightly open with a low dip angle at 129', appearing to be water bearing. Plagioclase clasts identified at 129'6", sampled at 127'.	V				Plagioclase		
			SV	1	5	?			
			M						
			SH		2	Y			
130			H						
130	5'9"	Tuff, light-medium gray, welded and dense, massive to moderately foliated; frequency of lithic clasts increased. Secondary minerals, calcite and other greenish color minerals (epidote?) observed on small fracture planes apparently dipping 46-57 degrees. A fracture at 132', with prominent Fe staining, appears to be water bearing. Pumice filled with light color secondary minerals. Evidence of slip prevalent in fractures. "Flinty" in pale green mineralized zone at 132'5".	V				Calcite, secondary		
			SV	2					
			M	2	4	Y			
			SH						
135			H						

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135	4'6"	Tuff, gray, welded, denser, and more brittle with more lithic and crystal clasts than in last core run. Very small muscovite or sericite clasts observed. Two slightly open fractures and three thin filled fractures noted in this core run. At the end of the run, a set of conjugated annealed fractures noted parallel to the flow layer or foliation at 139.7', approximately 5% offset. Flow bands apparently dip 55-65 degrees. Secondary minerals on the surface of fractures slightly react with hydrochloric acid.	V				Muscovite or sericite; secondary: calcite
T O			SV				
140			M	3	2	?	
			SH				
140	4'6"	Tuff, gray, well welded, very dense and competent. Flow bands/layers/foliation apparently dipping at 65 degrees. The top 0.4' of the core fractured by a set of conjugate fractures (one with medium dip appears to be generally perpendicular to flow bands or foliation and the other with sub-vertical dip, almost parallel to flow bands/foliation). This zone appears to be water bearing. Several inches of core loss at 144' implying an open, horizontal fracture. A slickenside observed at 144.5'.	V				Same as above
T O			SV	4	2	Y	
145			M		2		
			SH				
145	5'2"	Tuff, same as above lithology, but with many annealed fractures. Dip in different directions at different angles. Fractures with low angles almost perpendicular to flow bands/layers apparently dipping 68 degrees. Two slightly vertical open fractures sealed with white minerals reacted slightly with hydrochloric acid. Apparent dip of the flow bands steepen, sub-vertical with depth. Fractured amygdales with approximately 0.75" displacement at 148.7'.	V				Calcite and/or dolomite
T O			SV	9	2	?	
150			M				
			SH		2	N	
			H				

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150	5'7"	Tuff, gray, lithology as described above, well welded, multidirectional sealed fractures at the bottom foot of this run. Several of the fractures intersect flow bands/layers obliquely. Foliation defined by black fiamme clasts. Vertical fractures at 150'8", offset approximate 0.1". Horizontal fracture at 151', open fracture at 153'10" exhibits clay mineral rind. Weathering feature along the plane of an open fracture at 154.6. Calcite filling annealed fractures.	V	3			Calcite
T O			SV	2			
			M	1	1	Y	
155			SH	1			
155	4'11"	Lapilli tuff, gry to light gray, moderately welded and foliated. Clast size 0.1-0.15". At 157.6', the groundmass is finer, well developed fractures (photograph) with apparent flow banding with a dip angle of approximate 50 degrees. At 158', a set of conjugate fractures developed. The left hand group almost perpendicular to the flow banding, while the other group parallel to the banding.	V				
T O			SV	7	3	?	
			M	3	1	?	
160			SH				
160	5'2.5"	Tuff, medium gray, slightly welded and foliated, uniform fine sand-sized texture. Abundant sericite, well developed sub-vertical angle fractures. Secondary minerals including pyrite, calcite, and other unidentified hydrated silicates formed on a fracture surface. Fresh tension fractures begin at 163.7' to the base of the core run, which appear to be induced by coring. No water noted.	V		2	N	Sericite, and secondary calcite & pyrite
T O			SV	18	4	N	
			M				
165			SH				
165	3'6"	Tuff to lapilli tuff, gray, texture generally coarser than the last few core runs, less fractured, but with the same fracture pattern. Calcite coating and pyrite cubes on slickenside at 165'10". Ductile flow feature observed at 167'6". Several sealed fractures developed parallel to dark fiamme streaks, minerals in fractures appear to be hydrated silicates (photographed at 167.6"). Apparent bedding or foliation dips approximately 56 degrees. The core could not be completely pulled up, but will be recovered in next run.	V	1			
T O			SV	4	1	?	
			M				
170			SH				
			H				

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170	5'3"	Lapilli tuff, gray, weakly welded and foliated, groundmass moderately devitrified, very dense and competent with no fractures. Visible flow bands or layers. Welding evidenced by flattened fiamme and pyroclastic flowing around pumice fragments, annealed fractures along flow banding with a medium apparent dipping angle. Erosion surface at 174.15' marks increase in average clast size (0.15").	V				
T O			SV	2		N	
			M				
			SH				
175			H				
175	5'7"	Tuff, gray, dense, hard, and more flinty. Foliation or flow bands still visible, but less welded. Some porphyritic texture due to some feldspar grains and pumice clasts scattered in the groundmass. A large pumice clast at 178.7' exhibits diffuse edges (assimilation with elevated temperature). Flinty filled fractures along flow banding. At the base of the run, texture becomes coarser. Two slightly open fractures observed in this core run.	V				Feldspar and calcite
T O			SV	2	2	N	
			M	5			
			SH				
180			H				
180	6'4"	Lithic tuff, gray, clasts very coarse and unsorted in top two feet of the core. Several clasts up to 2.5" in length, with most of them size between 0.15 -1.2". Some pumice pores filled by feldspar or other hydrated silicates. Weak banding or foliation marked by interlayered light colored lapilli-sized pumice and dark fiamme or glass shards. A vein or possibly a large fragment of agate or flint observed at 182', underlain by fine to coarse welded lapilli tuff. Sampled at 182.15'. Rare fractures and no water.	V				Quartz and feldspar
T O			SV				
			M		1	N	
			SH		1	N	
185			H				