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Date Logged	Sample Number	Depth Interval (feet bgs) From	Depth Interval (feet bgs) To	Comments
7/16/2003	24P-0-2.5	0.00	2.50	Samples 0 - 5 ft collected by pan on annular return side of collector using conventional circulation. Cannot collect cleanout material until surface casing is installed. Thick caliche coatings (1/8") on gravel clasts are present from 2.5 to 17.5 ft. From 0 to 50 ft gravel clasts are significantly more angular than gravel clasts at 29P. Gravel and sand is almost entirely derived from moderately to densely welded tuffs. Gravel clasts display lithologic heterogeneity: moderate brown (5YR 4/3), orange pink (2.5YR 8/2), dark brown (10YR 3/1), olive green (5Y 5/4), brownish gray (10R 4/1).
7/16/2003	24P-2.5-5.0	2.50	5.00	
7/16/2003	24P-5.0-7.5	5.00	7.50	5-20 ft: still significant annular return. Using both conventional and reverse circulation. Losing fines due to air winnowing at cyclone collector from 5-25 ft.
7/16/2003	24P-7.5-10.0	7.50	10.00	
7/16/2003	24P-10.0-12.5	10.00	12.50	
7/16/2003	24P-12.5-15.0	12.50	15.00	
7/16/2003	24P-15.0-17.5	15.00	17.50	
7/16/2003	24P-17.5-20.0	17.50	20.00	
7/16/2003	24P-20.0-22.5	20.00	22.50	At 20 ft begin reverse circulation air rotary drilling. At 20.00 ft stabilize hole with cement. At 22.5 ft small sample. Less than 1 gal. Sample possibly affected by cement moisture. First appearance of black glassy chert fragment.
7/16/2003	24P-22.5-25.0	22.50	25.00	
7/16/2003	24P-25.0-27.5	25.00	27.50	First appearance of weathered vesicular basalt.
7/16/2003	24P-27.5-30.0	27.50	30.00	So far, there isn't a presence of calcite fragments or calcite fracture fill as seen at 29P.
7/16/2003	24P-30.0-32.5	30.00	32.50	Near surface alluvial sediments have fewer occurrences of silty sand (SM) than seen at 29P, and less well-graded sand (SW) which predominated at 29P.
7/16/2003	24P-32.5-35.0	32.50	35.00	Driller reports good drilling. Probably less bouldery than 29P.
7/16/2003	24P-35.0-37.5	35.00	37.50	
7/16/2003	24P-37.5-40.0	37.50	40.00	

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Date Logged	Sample Number	Depth Interval (feet bgs) From	Depth Interval (feet bgs) To	Comments
7/16/2003	24P-40.0-42.5	40.00	42.50	
7/16/2003	24P-42.5-45.0	42.50	45.00	
7/16/2003	24P-45.0-47.5	45.00	47.50	
7/16/2003	24P-47.5-50.0	47.50	50.00	
7/16/2003	24P-50.0-52.5	50.00	52.50	
7/16/2003	24P-52.5-55.0	52.50	55.00	Gravel lithologic heterogeneity decreases somewhere around 55 ft and becomes predominantly Mod. Brown 10YR 3/3.
7/16/2003	24P-55.0-57.5	55.00	57.50	
7/16/2003	24P-57.5-60.0	57.50	60.00	Set and cement surface casing at 60 ft.
7/16/2003	24P-60.0-62.5	60.00	62.50	
7/17/2003	24P-62.5-65.0	62.50	65.00	Begin drilling out of surface casing. Coarse sandy material (SW), with gravel. Losing fines due to air winnowing at cyclone. At 65 ft we encounter the first horizon that does not react strongly to 10% HCl acid.
7/17/2003	24P-65.0-67.5	65.00	67.50	
7/17/2003	24P-67.5-70.0	67.50	70.00	
7/17/2003	24P-70.0-72.5	70.00	72.50	
7/17/2003	24P-72.5-75.0	72.50	75.00	Coarsening downward sequence since 60 ft.
7/17/2003	24P-75.0-77.5	75.00	77.50	Scoriaceous brown basalt, not the usual black vesicular basalt common to EWDP boreholes.
7/17/2003	24P-77.5-80.0	77.50	80.00	Gravel clasts continue to be predominately moderately to densely welded. Almost no nonwelded. At 80 ft driller stops advancing and prepares for core run #1. Several feet of fill is at bottom of hole due to caving of loose and coarse material. Driller will "blow" bentonite through bit and uphole through annular space to cleanout and stabilize for core run. Fill at bottom should protect core sample from bentonite contamination.

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Date Logged	Sample Number	Depth Interval (feet bgs) From	Depth Interval (feet bgs) To	Comments
7/17/2003	24P-80.0-82.5	80.00	82.50	Bentonite (contamination): high plasticity and clay. Sand and fines are a guess. No HCl reaction determination due to presence of bentonite in sample. Over ream core run #1 from 80 to 81.7 ft, small sample. Interval 80 - 100 ft drilled with center return air hammer reverse circulation.
7/17/2003	24P-82.5-85.0	82.50	85.00	Gravel lithology continues to be very homogeneous overall. 90% is Mod. Brown (10YR 3/3).
7/17/2003	24P-85.0-87.5	85.00	87.50	
7/17/2003	24P-87.5-90.0	87.50	90.00	
7/17/2003	24P-90.0-92.5	90.00	92.50	
7/17/2003	24P-92.5-95.0	92.50	95.00	
7/17/2003	24P-95.0-97.5	95.00	97.50	
7/17/2003	24P-97.5-100.0	97.50	100.00	Cleanout material weight for 80 to 100 ft = 78.15kg. Cleanout after break = 153.9kg. Essentially from entire interval (60 - 100ft). 15 ft of fill in hole after break (7/17/03 to 7/22/03).
7/22/2003	24P-100.0-102.5	100.00	102.50	Only 3 or 4 gravel lithologies. All are moderately to densely welded. No nonwelded. Microscopic view of interval 100 - 102.5 ft: fine sand is 65% nonwelded, 15% welded, 15% quartz, 5% basalt; medium sand is approximately 50:50 nonwelded to welded, 1% quartz, 5% basalt; coarse sand is 75% welded, 10% nonwelded, 1% quartz, 14% basalt. Fine gravels are 100% welded, no quartz, 1% basalt. Coarse gravels are 100% welded, trace quartz, 10% basalt. Drilled remainder of borehole with RC center return tricone (except DC's).
7/22/2003	24P-102.5-105.0	102.50	105.00	
7/22/2003	24P-105.0-107.5	105.00	107.50	
7/22/2003	24P-107.5-110.0	107.50	110.00	
7/22/2003	24P-110.0-112.5	110.00	112.50	Thin lense of weakly cemented sand (~1" based on cuttings fragment). Strong effervescence. Sample volumes have been consistent. So we're getting a good representative sample.
7/22/2003	24P-112.5-115.0	112.50	115.00	Losing some material through the annulus during cleanout.
7/22/2003	24P-115.0-117.5	115.00	117.50	Fines lost at cyclone due to winnowing of air at cyclone. Hole is very unstable due to loose granular material with very little fines as binder.
7/22/2003	24P-117.5-120.0	117.50	120.00	Cleanout material weight from 100 - 120 ft = 121.75 kg.

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Date Logged	Sample Number	Depth Interval (feet bgs) From	Depth Interval (feet bgs) To	Comments
7/22/2003	24P-120.0-122.5	120.00	122.50	Core run #2 interval 120.13 - 121.34 ft was over reamed and cuttings were sampled and logged. From 120 to 161.37 ft gravel lithology is more heterolithic: more colors and ~10% nonwelded clasts are present. Moisture is very slight (1-2%) from 120 to 161.37 ft.
7/22/2003	24P-122.5-125.0	122.50	125.00	
7/22/2003	24P-125.0-127.5	125.00	127.50	Cuttings samples from 125 to 160 ft have a drier field moisture than natural because they were stockpiled while waiting for the batteries in the scale to be changed out.
7/22/2003	24P-127.5-130.0	127.50	130.00	
7/22/2003	24P-130.0-132.5	130.00	132.50	
7/22/2003	24P-132.5-135.0	132.50	135.00	
7/22/2003	24P-135.0-137.5	135.00	137.50	
7/22/2003	24P-137.5-140.0	137.50	140.00	Cleanout material weight from interval 120 to 140 ft = 188.30 kg.
7/22/2003	24P-140.0-142.5	140.00	142.50	
7/22/2003	24P-142.5-145.0	142.50	145.00	
7/22/2003	24P-145.0-147.5	145.00	147.50	
7/22/2003	24P-147.5-150.0	147.50	150.00	
7/22/2003	24P-150.0-152.5	150.00	152.50	
7/22/2003	24P-152.5-155.0	152.50	155.00	
7/22/2003	24P-155.0-157.5	155.00	157.50	
7/22/2003	24P-157.5-160.0	157.50	160.00	Cleanout material weight from interval 140 to 160 ft = 119.30 kg.

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Date Logged	Sample Number	Depth Interval (feet bgs) From	Depth Interval (feet bgs) To	Comments
7/22/2003	24P-160.0-162.5	160.00	162.50	Core interval 160 to 162.13 ft over reamed, and cuttings were sampled and logged. Gravel clasts are heterolithic from 160.00 to 200.00 ft. At 160 to 162.5 ft over reamed cuttings sample is contaminated with bentonite.
7/22/2003	24P-162.5-165.0	162.50	165.00	
7/22/2003	24P-165.0-167.5	165.00	167.50	
7/22/2003	24P-167.5-170.0	167.50	170.00	
7/22/2003	24P-170.0-172.5	170.00	172.50	
7/22/2003	24P-172.5-175.0	172.50	175.00	
7/22/2003	24P-175.0-177.5	175.00	177.50	
7/22/2003	24P-177.5-180.0	177.50	180.00	Cleanout material weight for interval 160 to 180 ft = 112.35 kg.
7/23/2003	24P-180.0-182.5	180.00	182.50	Samples are coarsening from 180 to 195 ft. Less fines and less moisture than above intervals.
7/23/2003	24P-182.5-185.0	182.50	185.00	
7/23/2003	24P-185.0-187.5	185.00	187.50	
7/23/2003	24P-187.5-190.0	187.50	190.00	
7/23/2003	24P-190.0-192.5	190.00	192.50	
7/23/2003	24P-192.5-195.0	192.50	195.00	
7/23/2003	24P-195.0-197.5	195.00	197.50	
7/23/2003	24P-197.5-200.0	197.50	200.00	Cleanout material weight for interval 180 to 200 ft = 102.65 kg.

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Date Logged	Sample Number	Depth Interval (feet bgs) From	Depth Interval (feet bgs) To	Comments
7/23/2003	24P-200.0-202.5	200.00	202.50	Bentonitic.
7/23/2003	24P-202.5-205.0	202.50	205.00	
7/23/2003	24P-205.0-207.5	205.00	207.50	
7/23/2003	24P-207.5-210.0	207.50	210.00	
7/23/2003	24P-210.0-212.5	210.00	212.50	
7/23/2003	24P-212.5-215	212.50	215.00	
7/23/2003	24P-215.0-217.5	215.00	217.50	
7/23/2003	24P-217.5-220.0	217.50	220.00	Cementation at 217.5 to 220 ft and at 230 to 232.5 ft: strong grain coatings on gravels, and fragments of cemented medium-coarse sand. Cementation is not throughout total interval; thin seams are present. Poorly graded medium grained sand. Cleanout material weight from interval 200 - 220 ft = 65.55 kg.
7/23/2003	24P-220.0-222.5	220.00	222.50	
7/23/2003	24P-222.5-225.0	222.50	225.00	
7/23/2003	24P-225.0-227.5	225.00	227.50	
7/23/2003	24P-227.5-230.0	227.50	230.00	
7/23/2003	24P-230.0-232.5	230.00	232.50	
7/23/2003	24P-232.5-235.0	232.50	235.00	Increased percentage of cemented medium-coarse sand from 232.5 to 237.5 ft.
7/23/2003	24P-235.0-237.5	235.00	237.50	
7/23/2003	24P-237.5-240.0	237.50	240.00	Decreased occurrence of grain coatings, but still present. Material weight of cleanout for interval 220 to 240 ft = 49.35 kg.

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Date Logged	Sample Number	Depth Interval (feet bgs) From	Depth Interval (feet bgs) To	Comments
7/23/2003	24P-240.0-242.5	240.00	242.50	Core run #5 interval over reamed (240 to 241.75 ft).
7/23/2003	24P-242.5-245.0	242.50	245.00	Cement coatings on gravel clasts. Coating is hard medium sand.
7/23/2003	24P-245.0-247.5	245.00	247.50	Sample contains clast of chalcedonic quartz (3/4" diameter). Weak cement is assumed based on strong reaction of sediment to 10% HCl acid.
7/23/2003	24P-247.5-250.0	247.50	250.00	
7/23/2003	24P-250.0-252.5	250.00	252.50	
7/23/2003	24P-252.5-255.0	252.50	255.00	
7/23/2003	24P-255.0-257.5	255.00	257.50	Poor sample recovery.
7/23/2003	24P-257.5-260.0	257.50	260.00	Cleanout material weight from interval 240 to 260 ft = 104.10 kg.
7/24/2003	24P-260.0-262.5	260.00	262.50	
7/24/2003	24P-262.5-265.0	262.50	265.00	Cement coatings on gravel clasts. Coating is hard medium sand.
7/24/2003	24P-265.0-267.5	265.00	267.50	
7/24/2003	24P-267.5-270.0	267.50	270.00	
7/24/2003	24P-270.0-272.5	270.00	272.50	
7/24/2003	24P-272.5-275.0	272.50	275.00	Material continues to display poor grading with increased clay content. General trend of decreasing gravel content and increasing fines.
7/24/2003	24P-275.0-277.5	275.00	277.50	Weak cementation is assumed based on strong reaction to 10% HCL acid. Poorly graded with 11% gravel. From 275 to 310 ft cemented sand grains and caliche coatings are common.
7/24/2003	24P-277.5-280.0	277.50	280.00	Decreased heterogeneity of gravel clast lithology. Material cleanout weight for interval 260 to 280 ft = 125.30 kg.

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Date Logged	Sample Number	Depth Interval (feet bgs) From	Depth Interval (feet bgs) To	Comments
7/24/2003	24P-280.0-282.5	280.00	282.50	Poorly graded with 27% gravel. Last observed vesicular basalt occurs at interval 280 - 282.5 ft.
7/24/2003	24P-282.5-285.0	282.50	285.00	
7/24/2003	24P-285.0-287.5	285.00	287.50	
7/24/2003	24P-287.5-290.0	287.50	290.00	
7/24/2003	24P-290.0-292.5	290.00	292.50	
7/24/2003	24P-292.5-295.0	292.50	295.00	
7/24/2003	24P-295.0-297.5	295.00	297.50	
7/24/2003	24P-297.5-300.0	297.50	300.00	Cleanout material weight from 280 to 300 ft = 80.6 kg. Interval 297.5 - 300 ft, and to a lesser degree 300 to 302.5 ft, contains very sticky clay and maybe bentonitic.
7/24/2003	24P-300.0-302.5	300.00	302.50	
7/24/2003	24P-302.5-305.0	302.50	305.00	
7/24/2003	24P-305.0-307.5	305.00	307.50	
7/24/2003	24P-307.5-310.0	307.50	310.00	
7/24/2003	24P-310.0-312.5	310.00	312.50	Strong HCl reaction and hardness of material in muffin pans imply weak cement. Gravel summary from surface to 312.5 ft: 75% moderately to densely welded ash flow tuff, 25% nonwelded; minor (less than 5%) black (N2.5 gray) and dark reddish brown (5YR 2.5/2) vesicular basalt from 0 to 245 ft, less than 1% from 245 to 282.5 ft, absent below 282.5 ft. Ash flow clasts are multi-colored from 0 to 312.5 ft and range from: dark reddish brown (5YR 3/2), dark red (10R 3/6), dark red (2.5YR 3/2), red (2.5YR 5/4), red (10R 4/8), reddish yellow (5YR 7/4), yellow (10YR 8/2), yellow (2.5Y 7/4), white (N9), and includes the brown and black basalt clast described above. Grain coatings in the form of caliche and/or cemented sand grains on gravel clasts are present in minor amounts throughout alluvial section. Gravel clast shape is predominantly subangular throughout alluvial section with lesser subrounding.
7/24/2003	24P-312.5-315.0	312.50	315.00	Cemented medium sand grains coating gravel clasts imply moderate cementation. Below 312.5 ft clasts become increasing less heterogenetic and are moderately welded, yellowish red (5YR 5/4) to strong brown (7.5YR 5/4), grain coatings increase.
7/24/2003	24P-315.0-317.5	315.00	317.50	
7/24/2003	24P-317.5-320.0	317.50	320.00	

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7/25/2003	24P-320.0-322.5	320.00	322.50	Sand components is ~80% monolithic with about a 60:40 ratio of welded to nonwelded grains. Gravel clasts are ~100% monolithic and 100% welded. Cleanout material weight from interval 300 - 322.5 ft = 60.65 kg.
7/25/2003	24P-322.5-325.0	322.50	325.00	
7/25/2003	24P-325.0-327.5	325.00	327.50	Caliche coatings on gravel clasts from 325 to 330 ft, and at 332.5 to 335 ft. Better sample recovery after flooded mud conditioning down the back side.
7/25/2003	24P-327.5-330.0	327.50	330.00	
7/25/2003	24P-330.0-332.5	330.00	332.50	
7/25/2003	24P-332.5-335.0	332.50	335.00	
7/25/2003	24P-335.0-337.5	335.00	337.50	
7/25/2003	24P-337.5-340.0	337.50	340.00	Cleanout material weight from interval 322.5 - 340 ft = 48.35 kg.
7/25/2003	24P-340.0-342.5	340.00	342.50	
7/25/2003	24P-342.5-345.0	342.50	345.00	
7/25/2003	24P-345.0-347.5	345.00	347.50	Slight increase in moisture from 345 to 360 ft.
7/25/2003	24P-347.5-350.0	347.50	350.00	
7/25/2003	24P-350.0-352.5	350.00	352.50	
7/25/2003	24P-352.5-355.0	352.50	355.00	
7/25/2003	24P-355.0-357.5	355.00	357.50	
7/25/2003	24P-357.5-360.0	357.50	360.00	Material continues to be very uniform in texture since 322.5 ft. Caliche and grain coatings indicate we're still in alluvium.

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7/25/2003	24P-360.0-362.5	360.00	362.50	
7/25/2003	24P-362.5-365.0	362.50	365.00	
7/25/2003	24P-365.0-367.5	365.00	367.50	
7/25/2003	24P-367.5-370.0	367.50	370.00	
7/25/2003	24P-370.0-372.5	370.00	372.50	
7/25/2003	24P-372.5-375.0	372.50	375.00	
7/25/2003	24P-375.0-377.5	375.00	377.50	A lot of grain coatings and cemented sand fragments present from 375 to 400 ft. Gravels are 90-95% homogeneous, sand grains are 75% homogeneous.
7/25/2003	24P-377.5-380.0	377.50	380.00	Cleanout material weight from interval 360 - 380 ft = 17.95 kg.
7/25/2003	24P-380.0-382.5	380.00	382.50	
7/25/2003	24P-382.5-385.0	382.50	385.00	
7/25/2003	24P-385.0-387.5	385.00	387.50	
7/25/2003	24P-387.5-390.0	387.50	390.00	
7/25/2003	24P-390.0-392.5	390.00	392.50	
7/25/2003	24P-392.5-395.0	392.50	395.00	
7/25/2003	24P-395.0-397.5	395.00	397.50	
7/25/2003	24P-397.5-400.0	397.50	400.00	Obvious increased moisture @ 400 ft. Based on dry samples in muffin pans, cementation by CaCO3 seems to be less. A strong reaction to HCl persists, samples didn't dry with as hard a crust as observed from ~200 to 322.5 ft. Microscopic view of interval 397.5 - 400 ft: fine sand is >=95% nonwelded; medium sand is roughly 50:50 nonwelded to welded; coarse sand is 75% welded. Gravel component: fine gravels are > 95% moderate to densely welded; coarse gravels are 100% densely welded. Core run #9: was expected to be driven at 400 ft. but was cancelled due to 4 ft of fill. Bedrock at approximately 401 ft. Sand and gravel components are all composed of one and the same lithology. Looks like Rainier Mesa: grayish brown (10R 5/2), moderately welded, crystal rich with predominantly sanidine and minor quartz, rare bronze biotite, minor small pumice. Material cleanout weight from interval 400 - 410 ft = 36.70 kg.