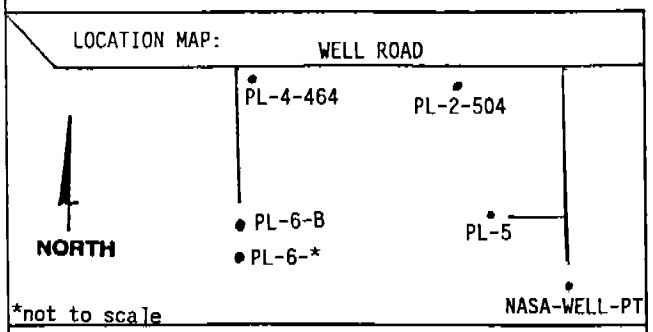
LITHOLOGIC LOG



SW 1/4 SW 1/4 NW 1/4 NE 1/4 S5 T21S R3E

SITE ID: NASA-WSTF LOCATION ID: PL-6-B

SITE COORDINATES (ft.):

N 227115.15 E 399683.92

GROUND ELEVATION (ft. MSL): 4481.69(BC)

STATE: NEW MEXICO COUNTY: DOÑA ANA

DRILLING METHOD: Mud Rotary

DRILLING CONTR.: Beylik Drilling Inc.

DATE STARTED: 11-30-90 DATE COMPLETED: 1-15-90

FIELD REP.: Contaldo, Menzie, Morse, Werden, Rogers, Huber

COMMENTS: 0-16.5', rotary with 24" Auger bit, set 14" surface casing to 16.5', mud rotary with 12¼" bit (tricone) and roller reamer to 1920'; Total Depth = 1920'. No bedrock encountered.

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval		Lithologic Description
				0-1920' (Cuttings - 10' grab samples)	0-650'	Alluvium (Santa Fe Group): Moderate yellowish brown (10 Y/R 5/4); cuttings range in size from less than 0.1 inch to 0.5 inch, occur as angular flakes or blocks, and are poorly sorted. Average cutting size is 0.2 inches. Formation is an unconsolidated to semi-consolidated polygenetic conglomerate. Individual clasts consist primarily of limestone with lesser amounts of andesite, caliche, rhyolite, sandstone, and quartz. This interval is relatively clay-rich. Variations in percent clay content, percent cutting lithology, and average cutting size are noted below.
10			80		10'	Well-graded gravel with silty clay (50%).
20			-		20'	Silty-clayey gravel
30			-		30'	Same as above
40			23		40'	Gravelly clay.
50			30		50'	Clay > sand/gravel.
60			22		60'	Gravelly alluvium.
70			16		70'	Same as above.
80			34		80'	Same as above.
90			60		90'	Clayey sand and gravel. Cuttings up to 0.5" in diameter.
100			30		100'	Same as above.

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description	
				Cuttings (cont'd)		
100			30			
110			40		110'	Very clayey, few rock fragments or cuttings.
120			35		120'	Very little clay. Cutting size decreases, predominately .1" - .2" in diameter, subrounded to subangular grains.
130			30		130'	80% clay. Bit bouncing at 131' - smooth drilling at 134"
140			35		140'	Mostly clay.
150			30			
160			40			
170			33		170'	80% clay, 20% fine to coarse sand size cuttings.
180			35			
190			45			
200			25			
210			25			
220			27		220'	Gravelly clay.
230			32			

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval		Lithologic Description
				Cuttings (cont'd)		
230			32		230'	Gravelly clay (same as above).
240			28		240'	Clay, < 5% cuttings (limestone). Cuttings may be from up-hole.
250			40		250'	Tan clay.
260			24		260'	Gravelly clay.
270			46		270'	Clay with medium-to fine-grained sand.
280			74		280'	Clayey gravel.
290			35		290'	Clayey.
300			30		300'	No clay, cuttings and grains small, 0.1" - 0.3" in diameter predominant. No cuttings larger than approximately 0.3" diameter.
310			50			
320			120			
330			115			
340			98			
350			41		350'	Sandy clay.
360			140		360'	Trace of clay, sedimentary (primarily limestone) and volcanic alluvium.

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval		Lithologic Description
				Cuttings (cont'd)		
360			140		360'	Sedimentary (primarily limestone) and volcanic alluvium, trace of clay.
370			125			
380			120			
390			150		390'	Increase in clay content.
400			175		400'	Mixed lithology alluvium. Rhyolite, andesite and limestone are major clasts. Few fines in sample.
410			120		410'	As above. Rhyolite is white, yellow and red in color, limestone is light to dark gray. Andesite is gray to reddish brown.
420			105		420'	An increase in maroon andesite clasts fragments. Limestone and rhyolite still dominant, some calcite present.
430			115			
440			113		440'	Limestone and volcanic cuttings - gravel, minor clay (drill mud?), cuttings similar in size and angular.
450			64		450'	No clay. Increase in volcanic fraction.
460			98		460'	Further increase in volcanic fraction.
470			150		470'	Very fine cuttings, all approximately 0.1" in diameter.
480			120			
490			135			

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval		Lithologic Description
				Cuttings (cont'd)		
490			135			
500			88		500'	Cutting size < .1 inches, mostly white iron-stained rhyolite and limestone. Minor amounts of andesite, siltstone, and quartz. Andesite fraction 10% to 15%.
510			45		500'-520'	Increase in drilling rate.
520			53			
530			91		530'	As above.
540			93			
550			75		550'	Medium to coarse sand size, lithology same as above.
560			78		560'	As above.
570			87		570'	As above - slight increase in cutting size. No clay.
580			90		580'	Slight increase in clay.
590			150		590'	Trace "flaky clay". This clay could be from mud cake on borehole wall.
600			35			
610			44			
620			47			

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
				Cuttings (cont'd)	
620			44		
630			40		630'-640' Mud "flakes" present in sample (< 10%).
640			40		
650			90		650'-1920' <u>Volcanic-rich Alluvium</u>: Cuttings range in color from very light gray (N8) to grayish black (N2) and range in size from less than 0.1 inch to 0.5 inches; are subrounded to angular, and are poorly sorted. Formation is a semi-consolidated to consolidated polygenetic conglomerate. Individual clasts are composed almost entirely of volcanic rocks. The volcanic rocks consist primarily of andesites, with several varieties of color and texture (see core description for PL-6-*), and lesser percentage (≈ 10%) of rhyolite (primarily flow-banded) and ash-flow tuff (< 10%), percent clay varies from < 10% to 20%. Variation in percent clay are noted below.
660			150		660'-740' Same as above.
670			56		
680			55		
690			70		
700			63		
710			61		
720			46		
730			128		
740			-		740' Cuttings are very uniform in size, average size .1".
750			165		750' Cuttings slightly coarser, average size ≈ .2".

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval		Lithologic Description
				Cuttings (cont'd)		
750			165			
760			145		760'	Same - cuttings are ≈ 0.2" and uniform as at 740'. Trace clay but <10%.
770			203		770'-780'	Same as above.
780			130			
790			210		790'	Maroon to reddish-purple andesite-rich alluvium. Trace calcite, epidote and altered andesite.
800			153			
810			122			
820			134		820'	Same. Trace clay (<10%).
830			240		830'	Same. Trace clay (< 10%), cuttings are coarse sand size ≈ 0.2", increase in calcite cuttings.
840			163		840'	Predominately black-gray and some maroon andesite-rich alluvium. Increase in clay content to 10%. Cuttings are finer ≈ 0.1" calcite and rhyolite.
850			185		850'	Maroon and black-gray andesite-rich alluvium. Calcite, rhyolite, and clay present in minor amounts.
860			156		860'	Slight increase in clay to 20%.
870			178		870'	Same as 860'.
880			291			

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval		Lithologic Description
				Cuttings (cont'd)		
880			291		880'	Maroon to gray-black andesite with trace of clay and calcite (< 10%).
890			325		890'	Same as above.
900			-			
910			248		910'-920'	Maroon and black-gray andesite-rich volcanic alluvium with trace clay.
920			180			
930			145		930'	Maroon to gray-black andesite-rich alluvium with trace of clay and calcite (< 2%).
940			288		940'	Same as 930', slight increase in clay (< 5%).
950			240		950'	Same, increase in clay to ≈ 10%.
960			305		960'	Same, decrease in clay content to < 10%.
970			185		970'-1000'	Approximately 10% clay.
980			142			
990			114			
1000			247		1000'	Maroon to medium brown to gray-black andesite alluvium. Trace clay and calcite.
1010			225		1010'	Same as 1000'

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description	
				Cuttings (cont'd)		
1010			195			
1020			166		1020'	Same as above but decrease in clay content.
1030			195			
1040			122		1040'	Maroon to medium brown to gray-black andesite-rich volcanic alluvium. Trace of clay and calcite. Cuttings are coarser (≈ 0.2").
1050			142		1050'	Dark gray to black to maroon andesite, brick red tuff(?) and light gray rhyolite clasts. Calcite is white.
1060			120		1060'	Brick red to medium brown to gray-black andesite-rich alluvium. Occasional white calcite fragments. Clay ≤ 5%.
1070			174			
1080			241		1080'	Same as 1070', except decrease in clay.
1090			172		1090'-1100'	Same as 1080'.
1100			136			
1110			150		1110'-1120'	Brick red to dark gray to black aphanitic andesite. Clear and milky calcite comprises ≈ 15% of sample. Trace of clay (few balls in sample).
1120			-		1120'-1130'	Hardly any calcite in this sample and no clay.
1130			-		1130'-1140'	Cuttings slightly finer, angular to subangular.
1140			172		1140'-1150'	Trace clay.

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description	
				Cuttings (cont'd)		
1140			172			
1150			115		1150'-1160'	Less clay.
1160			76			
1170			82		1170'-1200'	Decrease in percent clay to less than 10%, trace of calcite present.
1180			145			
1190			125			
1200			76			
1210			160			
1220			150		1220'	Some formation clay present in the volcanic-rich alluvium.
1230			173			
1240			132		1240'-1250'	Trace of clay.
1250			171		1250'-1260'	Increase in % calcite.
1260			74		1260'-1270'	Cuttings appear slightly weathered.
1270			73		1270'-1280'	Trace of clay and calcite. Calcite is milky or clear. Much of the andesite is either highly weathered or arenitic.

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
				Cuttings (cont'd)	
1270			73		
1280			157		
1290			98		1290'-1300' There is what appears to be some alluvium matrix cement (calcite) present in sample.
1300			85		
1310			125		
1320			86		
1330			135		
1340			-		1340' No sample collected at 1340'.
1350			-		1340'-1370' 90% of sample is angular cuttings that are uniform in size and shape. Average cutting size is ≈ 0.1 inch. Very little calcite (< 10%). Andesite is predominantly dark gray in color followed by brick red, aphanitic to slightly porphyritic, highly weathered.
1360			-		
1370			113		
1380			197		
1390			190		1390'-1410' Same as above.
1400			274		

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval		Lithologic Description
				Cuttings (cont'd)		
1400			274			
1410			181			
1420			140		1420'-1430'	Clay is present in about 10% of the sample. Caliche cemented grains are also at 10%.
1430			135			
1440			135		1440'	Decrease in percent clay to < 10%.
1450			110		1450'	Slight increase in percent caliche cuttings to ≈ 10%. Clay < 10%.
1460			159		1460'	Further increase in percent caliche cuttings to ≈ 20%. Clay < 10%.
1470			166		1470'	Slight decrease in percent caliche cuttings to ≈ 10%. Clay < 10%.
1480			126		1480'	Increase in percent caliche in cuttings. Clay is present (< 10%), but it looks like mud cake.
1490			149		1490'-1500'	No caliche.
1500			141			
1510			152		1510'	Increase in clay to ≥ 10%.
1520			117		1520'	Decrease in drill time. Clays ≥ 10% (white tan, and red clays). Increase in average cutting size.
1530			128			

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval		Lithologic Description
				Cuttings (cont'd)		
1530			128			
1540			181		1540'	Most cuttings are angular and range from .05" - .1" in diameter. Approximately 10% clay present. Some alluvial cement (calcite) is apparent.
1550			114		1550'	Less than 10% clay.
1560			128		1560'	Increased alluvial matrix cement (calcite).
1570			69			
1580			185			
1590			85		1590'	Calcite fragments present.
1600			68		1600'	Andesite-rich alluvium dominated by gray to black aphanitic andesite and maroon to red andesite and ash-flow tuff. Yellow (altered) tuff? and rhyolite also present. White calcite is found as above.
1610			80			
1620			85			
1630			90		1630'	Slight decrease in average cutting size to 0.1 inches. Lithology same as above.
1640			74		1640'	Slight increase in average cutting size to 0.15 inches.
1650			117		1650'	Increase in drill time.
1660			195		1660'	Further increase in drill time.

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description	
				Cuttings (cont'd)		
1660			195			
1670			210			
1680			226			
1690			105		1690'-1700	Trace of clay.
1700			79			
1710			70		1710'-1720'	Slight decrease in grain size.
1720			95			
1730			81			
1740			144		1740'	Trace of clay.
1750			130		1750'	Increase in calcite.
1760			75			
1770			80			
1780			91			
1790			127			

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
				Cuttings (cont'd)	
1790			127		
1800			225		
1810			150		
1820			182		1820' Large % of black andesite present.
					1820'-1830' Cuttings are angular and fairly uniform in size (average .10").
1830			168		
1840			197		1840' Increase in brick red andesite. Decrease in black andesite.
1850			225		1850' Further increase in percent reddish andesite containing 10% calcite.
1860			270		1860' Further increase in percent reddish andesite and decrease in percent black andesite. Angular clasts of reddish andesite are seen cemented by calcite in some of the larger cuttings.
1870			202		1870' Slight decrease in percent reddish andesite (rhyolite?) cuttings and increase in percent blackish andesite cuttings.
1880			140		1880' Same as above.
1890			115		1890' Sample is ≈ 80% reddish andesite and 20% blackish andesite. Trace of clay.
1900			194		1900'-1910' Clay-rich
1910			110		
1920			-		1920' = Total Depth