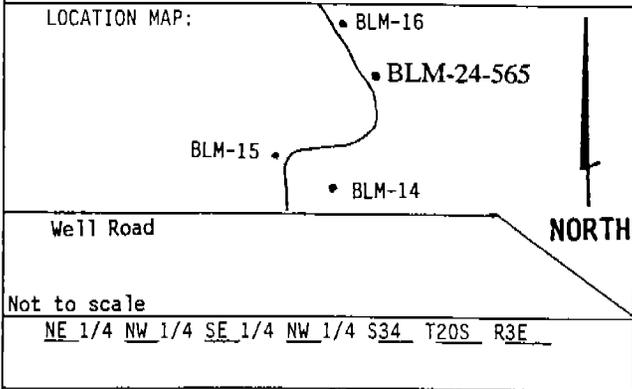


LITHOLOGIC LOG



SITE ID: NASA-WSTF LOCATION ID: BLM-24-565
 SITE COORDINATES (ft.):
 N 231861.46 E 410062.79
 GROUND ELEVATION (ft. MSL): 4715.28(surface casing)
 STATE: NEW MEXICO COUNTY: DOÑA ANA
 DRILLING METHOD: Mud/Air-Foam Rotary
 DRILLING CONTR.: Larion Drilling Co.
 DATE STARTED: 08/16/90 DATE COMPLETED: 09/20/90
 FIELD REP.: M. Canavan/D. Menzie
 COMMENTS: Drill mud rotary 0'-80', Install 10"x80' steel surface casing. Drill 80'-605' air foam rotary. Ash flow tuff bedrock encountered at 328'(determined by geophysical logs). Total depth = 605'.

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
				Cuttings (0'-605')	0'-328' Alluvium (Santa Fe Group): Samples range in color from light brown (5 YR 6/4) to moderate brown (5 YR 9/9). Cuttings in the samples are multicolored. Average cutting size is 0.02 inches and cuttings range from silt-size (much less than 0.1 inches) to 2.2 inches. Cuttings are rounded to angular with larger fragments and blocky clasts mostly angular to subrounded. Smaller alluvial grains are mostly rounded to subangular. Samples represent a poorly sorted, unconsolidated to moderately consolidated (based on increased drill times while drilling with tricone milltooth bit) polygenetic, pebble to boulder conglomerate. Lithologies of cuttings in the alluvium are comprised of medium dark gray (N4) to grayish black (N2) micritic to sandy limestone, light olive gray (5 Y 5/2) to grayish red (10 R 4/2) laminated to nonlaminated siltstone, white (N9) to light red (5 R 6/6) iron-stained rhyolite, brownish black (5 YR 2/1) sandstone, light brown (5 YR 6/4) to greenish gray (5 GY 6/1) tuff, pinkish gray (5 YR 8/1) to moderate red (5 R 5/4) granite, light gray (5 YR 6/1) to moderate pink (5 YR 7/4) caliche, and minor amounts of white calcite, multicolored chert, quartz and quartzite. Significant clay and caliche horizons are noted below.
5	VVVV=++		5'-40' (no times recorded)		
10	++++VVV=				
15	++++VVV=				
20	++++VVV=				
25	++++VVV=				
30	++++VVV=				
35	++++VVV=				0'-25' Gravelly clay. Grain sizes range from less than .1" to greater than 2.0" in diameter. Many grains are caliche coated. Cuttings range in shape from rounded to sub-angular.
40	++++VVV=				25'-45' Increasing percentages of smaller (less than .5") angular grains.
45	VVVV++++		11		30'-45' Decrease in amount of clay present.
50	++++VVV=		15		40'-45' Predominance of volcanics, drilled through boulder. Less than 10% clay present. Grain sizes range from .02"-.4" and shapes range from angular to rounded.
					45'-50' Grain sizes range from .05"-.6" but most are approximately .07".

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
50				Cuttings (cont'd)	50'-55' Some larger pebbles (1" diameter) present.
55	VVVV//		13		55'- Some (<10%) caliche present.
60	VVVV//		9		
65	VVVV//		10		
70	VVVV//		17		
75	VVVV//		13		75'-80' Siltstone and volcanics each make up 5% of sample.
80	VVVV//		17 Started drillograph		80'-85' 50% of sample is grout (from grouting in surface casing). Remaining 50% of sample logged as 100%. Cuttings average 0.1" and are angular to subrounded.
85	VVVV//		5		85'-90' 20% of sample is grout. Remaining 80% of cuttings logged as 100%.
90	VVVV//		6		90'-95' Caliche present as fragments, coatings on grains and cementing alluvium.
95	VVVV//		4		95'-120' 5-9% clay present.
100	VVVV//		4		100'-115' Cuttings range from .05" to .6" in diameter and are angular to subrounded.
105	VVVV//		5		105'-115' Caliche present as cementing agent in alluvium.
110	VVVV//		5		
115	VVVV//		6		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
115				Cuttings (cont'd)	
120	VVVVV/		3		120'-145' Cuttings are very uniform in size (average .1") and are angular to rounded.
125	VVVVV/		4		
130	VVVVV/		5		
135	VVVVV/		9		
140	VVVVV/		7		
145	VVVVV/		7		
150	VVVVV/		10		150'-170' Cuttings average .2" and are subangular to subrounded.
155	VVVVV/		6		
160	VVVVV/		4		
165	VVVVV/		4		
170	VVVVV/		7		
175	VVVVV/		4		
180	VVVVV/		4		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
180				Cuttings (cont'd)	180'-270' Cuttings average .2" and are angular to rounded.
185	VVVV//::		5		
190	VVVV//		5		
195	VVVV//		4		
200	VVVV//		5		
205	VVVV//		5		
210	VVVV//		8		
215	VVVV//::		6		
220	VVVV//::		8		
225	VVVV//::		6		
230	VVVV//::		8		
235	VVVV//::		6		
240	VVVV//::		8		
245	VVVV//::		13		

Depth	Visual %	Lith	Drilling Time Scale; min	Sample Type and Interval	Lithologic Description
245				Cuttings (cont'd)	
250			11		
255			7		
260			7		
265			8		
270			7		270'-290' Cuttings are rounded and gravel sized (average .2").
275			6		
280			14		
285			5		
290			8		290'-295' 5% cemented alluvium present.
295			39 Air hammer 9" bit		295'-300' Cuttings are well sorted, well-rounded gravel and average .2" in diameter. 5% cemented alluvium present.
300			18		300'-305' Less uniform size and more angular grains present. First occurrence of tuff in cuttings.
305			19		
310			5		305'-310' Cuttings change character and are angular to rounded with grain sizes ranging from .05" to .4" in diameter. Limestone decreases in % and these grains are well rounded.

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
310				Cuttings (cont'd)	
310					310'-330' Average cutting size is .2" and cuttings are more angular.
315	VVVVVV+++/:		6		
320	VVVVVV+++/:		9		
325	VVVVVV+++/:		9		
330	VVVVVV+++/:		8		328'-380' <u>Lithic Ash-Lapilli Welded Tuff</u> : Light brown (5 YR 6/4, wet) cuttings contain 5-30% lithic clasts. Clasts are often ferruginous and impart a brownish tint to a white ash matrix. Quartz (mostly rounded) is also a common clast. Cuttings are angular to rounded and range from less than .1" to .4" in diameter. This unit never reaches 100% in samples.
335	VVVVVV+++/:		10		
340	VVVVVVVVVV+		10		330'-350' Bimodal sample. Angular light brown (wet) (5 YR 6/4) lithic ash tuff cuttings average <.1" in diameter. Rounded to subrounded gravel averages .3" in diameter. Volcanic % increases with depth.
345	VVVVVVVVVV+		11		
350	VVVVVVVVVV+		11		350'-355' Glassy reddish volcanic present - possibly rhyolite.
355	VVVVVVVVVV+		8		355'-360' Cuttings average .05" in diameter.
360	VVVVVVVVVV+		10		
365	VVVVVVVVVV+		11		
370	VVVVVVVVVV+		10		
375	VVVVVVVVVV+		11		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
375				Cuttings (cont'd)	
380	VVVVVVVVVVVVVVVVV		10		380'-480' <u>Lithic Ash Lapilli Tuff</u> : Greenish gray (5 GY 6/1, wet) with similar characteristics to the above unit. The top of the unit appears to be erosional. The entire unit is altered and in various stages of argillization.
385	VVVVVVVVVVVVVVVVV		11		
390	VVVVVVVVVVVVVVVVV		14		380'-385' Flesh-colored lithic ash-lapilli tuff grading into greenish gray (5 GY 6/1, wet) lithic ash-lapilli tuff. Overall character of units is quite similar and color change may be due to weathering/alteration.
395	VVVVVVVVVVVVVVVVV		13		385'-435' Greenish gray (5 GY 6/1, wet) lithic ash-lapilli tuff. Up to 20% various rhyolites present also. Approximately 5% pale green (10 G 6/2) epidote present.
400	VVVVVVVVVVVVVVVVV		13		395'-400' Uniform angular cuttings average .05".
405	VVVVVVVVVVVVVVVVV		10		405'-410' Well rounded, uniform grains(.05"-.1"). Weathered epiclastic zone.
410	VVVVVVVVVVVVVVVVV		8		410'-425' Coarser grained .1"-.7", as above.
415	VVVVVVVVVVVVVVVVV		15		
420	VVVVVVVVVVVVVVVVV		21		
425	VVVVVVVVVVVVVVVVV		17		425'-430' Coarse grained epiclastic gravel. Tuff (as above) predominates. Andesites and rhyolites are also present.
430	VVVVVVVVVVVVVVVVV		13		430'-435' Subangular platy cuttings range from .05" to .3" in diameter. Other volcanics (20%) present. Much of the tuff is weathered to clay.
435	VVVVVVVVVVVVVVVVV		11		
440	VVVVVVVVVVVVVVVVV		11		435'-440' Overall color becoming darker gray. Dark gray (N3) aphanitic volcanic makes up 30% of sample.

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
440				Cuttings (cont'd)	440'-455' Samples becoming increasingly darker. A variety of volcanics are present.
445	VVVVVVVVVVVVVVVVV		12		445'-460' Volcanic-rich epiclastic zone. Cuttings are uniform in size, range from .05"-.1" in diameter, and are sub- to well rounded.
450	VVVVVVVVVVVVVVVVV		16		
455	VVVVVVVVVVVVVVVVV		16		
460	VVVVVVVVVVVVVVVVV		26		460'-465' Same as above, but slightly coarser grained.
465	VVVVVVVVVVVVVVVVV		24		465'-470' Coarser grained (.2" to .5").
470	VVVVVVVVVVVVVVVVV		21		470'-480' Coarser grained (.05"-.7") and poorly sorted.
475	VVVVVVVVVVVVVVVVV		24		
480	VVVVVVVVVVVVVVVVV		23		480'-605' <u>Lithic Crystal Ash Flow Tuff</u> : Dark purplish gray tuff contains from 30% to 70% lithic clasts which are up to .05" in diameter and are well rounded. Eu-subhedral ferromagnesian phenocrysts are also present. The cuttings are in various stages of argillization and contain much pale yellowish green (10 GY 7/2) epidote as an alteration product.
485	VVVVVVVVVVVVVVVVV		21		
490	VVVVVVVVVVVVVVVVV		21		
495	VVVVVVVVVVVVVVVVV		21		
500	VVVVVVVVVVVVVVVVV		20		500'-505' Volcanic epiclastic (volcaniclastic) unit. Highly weathered rounded cuttings often altered to clay.
505	VVVVVVVVVVVVVVVVV		19		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
570				Cuttings (cont'd)	
575			17		
580			15		
585			16		
590			20		
595			18		595'-600' Tuff, weathered to 60% clay.
600			15		
605			15		TD = 605'
610					
615					
620					
625					
630					
635					