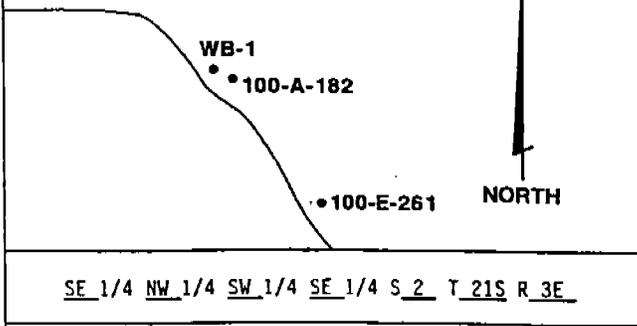


LITHOLOGIC LOG

LOCATION MAP:



SITE ID: NASA-WSTF LOCATION ID: WB-1

SITE COORDINATES (ft.):

N 223464.63 E 416613.89

GROUND ELEVATION (ft. MSL): 4840.94 (BC)

STATE: NEW MEXICO COUNTY: DOÑA ANA

DRILLING METHOD: Mud and Air-Foam Rotary

DRILLING CONTR.: Larion Drilling Co.

DATE STARTED: 01/16/90 DATE COMPLETED: 04-12-90

FIELD REP.: R. Cooper

COMMENTS: 0'-80' air-foam rotary (7 7/8" bit), 80'-160' mud rotary (7 7/8" bit), 160'-359' air-foam rotary (4" hammer-bit)

Top of bedrock between 95' and 105'. Total Depth = 359'

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
				Cuttings 0'-50'	0'-105' Alluvium (Santa Fe Group): Light brown (5 YR 6/4) to pale brown (5 YR 5/2) colored alluvium from silt and clay content. Cutting samples are multicolored. Cutting size ranges from silt-size to 45 mm (1.8 inches). cutting shapes range from angular to rounded. Subrounded to rounded alluvial grains comprise from 10% to 70% of each sample. Alluvium is an unconsolidated to semi-consolidated pebble to boulder polygenetic conglomerate. Alluvial clasts include light gray (N7) to dark gray (N3) limestone and dolomite, light olive gray (5 Y 5/2) and reddish brown (10 R 3/4) siltstone, moderate brown (5 YR 4/4) sandstone, white (N9) and mottled (red and white) iron-stained rhyolite, mottled (colorless and reddish brown) granite, grayish red (10 R 4/2) andesite, colorless to light gray (N7) quartz and chert. Caliche is present in the uppermost 35' of the alluvium. Rhyolite is the predominant igneous clast and comprises approximately 90% of the igneous fraction. The olive gray siltstone compresses ≥ 95% of the siltstone fraction. Alluvial/Bedrock contact is not clearly defined due to extreme weathering or alteration of sandstone and alluvial matrix.
5	VVVVVV++++		5		0'-5' Average cutting size 3-4 mm (0.12-0.16 inches), sandy gravel.
10	++++VVVV		6		10'-30' Gravelly sand, average size 1-2 mm (0.04-0.08 inches).
15	++++VVVV		8		30'-60' Sandy-gravel, average cutting size 3-4 mm (0.12 - 0.16 inches).
20	++++VVVV		6		
25	VVVVVV++++		4		
30	VVVVVV++++		4		
35	++++VVVV		6		
40	++++VVVV		4		
45	++++VVVV		6		
50	++++VVVV		8		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
50	vvvv			Cuttings (cont'd) 50'-115'	
55	vvvv		6		
60	vvvv		3.5		60'-65' Gravelly sand, average cutting size 1-3 mm (0.04-0.12 inches).
65	vvvv vvvv		3		65'-80' Sandy gravel, average cutting size 4-6 mm (0.16-0.24 inches).
70	vvvv		6		
75	vvvv		4		
80	vvvv		4		80'-160' Switched to mud rotary drilling.
85	vvvv		10		80'-85' Gravelly sand, average cutting size 2-3 mm (0.08-0.12 inches). 85'-90' Sandy gravel, average cutting size 4-6 mm (0.16-0.24 inches).
90	vvvv		36		Bedrock/Alluvial contact is not clearly defined and may be as high as 95' or as low as 105'.
95	vvvv		33		95'-100' Clay is very pale orange (10 YR 8/2).
100	vvvv		16		100'-140' Clay is dark yellowish orange (10 YR 6/6) possible sandstone with clay matrix; very soft weakly cement sandstone.
105	vvvv		11		105'-359' <u>Panther Seep Formation</u> : Interbedded moderate brown (5 YR 4/4) sandstones, light olive gray (5 Y 5/2) siltstones, dark gray (N3) to black (N1) calcareous shales and light gray (N7) to dark gray micritic to fossiliferous limestone. The (t) symbol is used to represent both limestone and calcareous shale fraction.
110	vvvv		17		
115	vvvv		16		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
115				Cuttings (cont'd) 115'-180'	
120			28		
125			21		
130			14		
135			13		
140			18		140'-145' 10% light olive gray (5 Y 5/2) to moderate yellowish brown (10 YR 5/4) clay.
145			12		145'-160' Yellowish brown to medium brown sandstone; some clay present; cuttings mixed with limestone-possible up-hole contamination, sandstone weakly to moderately cemented.
150			11		
155			10		
160			41 160'-T.D. Time recorded by driller		160'-180' Olive Green limestone mixed with medium to dark gray limestone.
165					160'-165' Average cutting size is 1-2 mm (0.04 - 0.08 inches).
170					165'-180' Average cutting size is 2-4 mm (0.08 - 0.16 inches). Olive green limestone is very silty and is weakly effervescent. Medium to dark gray limestones are more effervescent. Limonite staining is prevalent and hairline fractures are filled with calcite.
175					
180					

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
180		[Lithology]	160'-185' approx. 30 min.	Cuttings (cont'd) 180'-245'	180'-190' Cherty limestone, limestone is weakly effervescent, medium to dark gray, contains hairline fractures, some limonite staining; chert is light to medium gray and black. Average cutting size is 3 mm (0.12 inches).
185		[Lithology]			
190		[Lithology]	Time Recorded for 20' Interval 50		190'-195' Light to medium gray limestone, moderately effervescent. Average cutting size 1-2 mm (0.4 - 0.8 inches).
195		[Lithology]			
200		[Lithology]	7		195'-200' 50/50 mix of medium to dark gray limestone and light yellowish green fossiliferous limestone. Allochems < 1 mm (0.04 inches) in size.
205		[Lithology]			
210		[Lithology]	21		200'-205' Medium gray to dark gray limestone. Iron staining or limonite staining on ≈ 20% of cuttings. ≈ 2% calcite present. Limestone is strongly effervescent.
215		[Lithology]			
220		[Lithology]	12		205'-210' Light olive gray to olive gray and dark gray cuttings mixed. Light olive gray to olive gray cuttings have < 10% allochems and hairline fractures filled with what appears to be limonite. Both limestones moderately effervescent.
225		[Lithology]			
230		[Lithology]	38		210'-215' Calcareous shale, grayish black to black, very weakly effervescent.
235		[Lithology]			
240		[Lithology]	Time Recorded for 20' Interval 140		215'-230' Mix of black calcareous shale and light olive gray to light olive brown limestone which is heavily mineralized with limonite. Limestone moderately to strongly effervescent. Some limestone is platy and breaks to a thickness of less than 1 mm. The limestone appears to be silty. Calcite is found within cuttings and fills hairline fractures in shale and limestone.
245		[Lithology]			
					230'-245' Grayish black to black calcareous shale.
					235'-245' Calcite-filled hairline fractures.

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
				Cuttings (cont'd) 245'-310'	
245		[Lithology]			
250		[Lithology]	31		
255		[Lithology]	23		255'-275' Medium to dark gray micritic limestone. Weakly effervescent. Few calcite filled hairline fractures.
260		[Lithology]	24		
265		[Lithology]	36		
270		[Lithology]	41		
275		[Lithology]	39		275'-310' Black calcareous shale. Hairline fractures filled with calcite.
280		[Lithology]	39		
285		[Lithology]	18		
290		[Lithology]	30		
295		[Lithology]	30		
300		[Lithology]	31		
305		[Lithology]	22		
310		[Lithology]	53		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
				Cuttings (cont'd) 310'-359'	
310					310'-340' Dark gray to grayish black limestone. Limestone is fractured. Hairline fractures filled with calcite. Limonite or iron-staining on some cuttings. Microvugs are also present. Limestone is being replaced with sparite. Some unidentifiable allochems present in cuttings.
315			36		
320			40		
325			37		
330			48		
335			30		
340			54		340'-345' Dark gray to grayish black shaley limestone; few calcite-filled fractures.
345			76		345'-355' Dark gray limestone possibly shaley limestone; few calcite-filled fractures.
350			28		
355			25		355'-359' Olive brown limestone, weathered and limonite stained. Cuttings are muddy, possibly from being ground up during drilling.
360			44		Total Depth = 359'
365					
370					
375					