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Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 5 of 16)

Borehole Name: <u>UE-25 RF #62</u>					SAMPLE MANAGEMENT FACILITY			Cuttings ☐ Core ☒ <u>Sonic</u> QA:QA		
SMF ID: <u>1274</u>					GEOLOGIC LOG (Continuation Page)			From: <u>N/A</u> To: <u>N/A</u>		
Scale: <u>1 division = 1 ft</u> TD: <u>311.2'</u>					Logged By: <u>Hopkins Pitterle</u>		Date: <u>9-28-06</u>		Verified By (Printed Name/Signature): <u>Chris Lewis</u> Date: <u>10/14/08</u>	
Date Drilled	Depth	Piece Length	Frequency	Graphic	Fracture			Lithology		
					Fracture Description/Remarks			Welding	Rock Type	Unit
1	2	3	4	5	6	7	8	9	10	
<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>Description Only</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>Continuation Page</u> <u>102.6' - 137.0' Crystal Rich Member,</u> <u>Mixed Pumice subzone. Pyroclastic flow:</u> <u>Non to partially welded, crystallized and</u> <u>intensely vapor-phase corroded (very</u> <u>porous), pale red to weak red (2.5YR</u> <u>6/1 - 7/1); 5-20% pumice, dark reddish-</u> <u>gray (7.5R 4/1), reddish-gray (7.5R 5/1),</u> <u>gray (N8) and white (N9), vapor-phase</u> <u>corroded, moderately deformed,</u> <u>mostly < 1 cm, up to 3.5 cm; rare lithics</u> <u>(< 1%), white (N9), angular, up to 15mm; 12-15%</u> <u>crystal fragments of sanidine and</u> <u>plagioclase, lesser oxidized biotite and</u> <u>pyroxene(?).</u>	

Note: All Blanks Are Intentional

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Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 6 of 16)

Borehole Name: UE-25 RF #62		SMF ID: 1274		SAMPLE MANAGEMENT FACILITY GEOLOGIC LOG				Cuttings ☐ QA:QA	
Location (approximate):				Core Size: HQ3(2.375")				Core ☒	
Elevation (approximate):		Inclination: -90°		Revision # / Date: Rev. 0, 10-14-2008		From: 108.0'		To: 118.0'	
Bearing:		Rig: 6P 24 300 RS		Logged By: Pitterle		Date: 7-11-06		Verified by (Printed Name/Signature): Chris Lewis	
Scale: 1 division = 1'		TD: 311.2		Date: 7-12-06		Date: 10/14/08			

GRAPHIC: Rubble Unrecovered Breccia			ROCK TYPE: VOLCANIC: Ignimbrite Lithophysal Vitrophyre SEDIMENTARY: Carbonate Alluvium Conglomerate Claystone Siltstone Sandstone OTHER:			WELDING: Non Partial Moderate to Dense		
---	--	--	---	--	--	---	--	--

Fracture Description/Remarks					Lithology Description/Remarks				
Date Drilled	Depth	Piece Length	Frequency	Graphic	Origin: Natural, Coring, Handling, Indeterminant. Dip: Angle between plane parallel to axis of core and plane of feature expressed in degrees. Fracture Line: Planar, Irregular, Curved, Stepped. Surface Characteristics: Smoothness, roughness, coatings, and fillings.	Welding	Rock Type	Unit	Lithology: Unit, Member, Zone, Subzone. Matrix: Welding, alteration, color, other distinctive features. Pumice: %, color, alteration, size, aspect ratio. Lithophyses: %, rounding, size, alteration. Lithic clasts: %, color, size. Crystal Fragments: %, type or mineral (felsics, mafics).
1	2	3	4	5	6	7	8	9	10
7/11/06	108.0 3.1 4.8	0.0			All surfaces are rough & irregular. Very friable due to Vapor-Phase alteration of matrix.			T P C r n 2	Tiva Canyon Tuff, Crystal-rich member, nonlithophysal zone, mixed pumice subzone. From 108'-137'. Pyroclastic flow: Moderately welded, crystallized, weak red (2.5YR 5/2); matrix is very porous due to Vapor-Phase alteration; 10-12% pumice, corroded, in gray (N5), up to core diameter (6 cm), white (N9) and reddish-brown to reddish-gray (5YR 3-2), up to 40mm; most are less than 1cm, moderate aspect ratios; < 1% lithics, white (N9), volcanic, subangular to subrounded, up to 20mm; 7-10% phenocrysts of feldspar, oxidized biotite. Acicular crystals of hornblende and bladed hematite occur in corrosion cavities.
7/12/06	112.8 5.2 5.2	1.58			Rough, irregular breaks, clean, random orientations				
	118.0				@ 117.3 Fract. surface with white, non crystalline fill 2mm thick. Rough & irregular.				
					End of HQ core at 118.0'				

Note: All Blanks Are Intentional

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Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 7 of 16)

Borehole Name: UE-25 RF #62		SMF ID: 1274		SAMPLE MANAGEMENT FACILITY GEOLOGIC LQG				Cuttings ☒ QA:QA	
Location (approximate): N: 768199, E: 569271				Core Size: N/A		Revision # / Date: Rev. 0, 10-14-2018		From: 118.0' To: 159.0'	
Elevation (approximate):		Inclination: -90°		Core Size: N/A		Revision # / Date: Rev. 0, 10-14-2018		From: 118.0' To: 159.0'	
Bearing: N/A		Rig: GP 24-300 S		Logged By: Hopkins		Date: 7-17-06		Verified by (Printed Name/Signature): Chris Lewis	
Scale: 10 ft. between solid lines		TD: 311.2		Logged By: Pitterle		Date: 7-17-06		Verified by (Printed Name/Signature): Chris Lewis	
GRAPHIC: Rubble Unrecovered Breccia				ROCK TYPE: VOLCANIC: Ignimbrite Lithophysal Vitrophyre Bedded SEDIMENTARY: Carbonate Alluvium Conglomerate Claystone Siltstone Sandstone OTHER:					
WELDING: Non Partial Moderate to Dense									
Fracture Description/Remarks					Lithology Description/Remarks				
Date Drilled	Depth	Piece Length	Frequency	Graphic	Origin: Natural, Coring, Handling, Indeterminant. Dip: Angle between plane parallel to axis of core and plane of feature expressed in degrees. Fracture Line: Planar, Irregular, Curved, Stepped. Surface Characteristics: Smoothness, roughness, coatings, and fillings.	Welding	Rock Type	Unit	Lithology: Unit, Member, Zone, Subzone. Matrix: Welding, alteration, color, other distinctive features. Pumice: %, color, alteration, size, aspect ratio. Lithophysae: %, rounding, size, alteration. Lithic clasts: %, color, size. Crystal Fragments: %, type or mineral (felsics, mafics).
1	2	3	4	5	6	7	8	9	10
7/17/06	118.0	N/A	N/A		Rotary Hammer drilling from 118.0' to 159.0'			T	Tiva Canyon Tuff, Crystal Rich member, Nonlithophysal zone, mixed pumice subzone
	128.0				Cuttings only			P	From 118.0'-137.0' Pumice appear to decrease from 15-20% to approx. 8% at base of unit.
	138.0							C	
	148.0							r	
	159.0							n	
								2	
								1	137.0'-155.0' Crystal Rich member, non-lithophysal zone; Crystal transition subzone
									Pyroclastic flow: Moderately to densely welded, Crystallized, light gray (N7); ~10% pumice(?) (hard to distinguish from matrix); lithics not observed; ~12% Crystal fragments of Sanidine and plagioclase rapidly decrease to <5% at base of unit; rare oxidized biotite.

Note: All Blanks Are Intentional

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Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 8 of 16)

Borehole Name: <u>UE-25 RF#62</u> SMF ID: <u>1274</u>		SAMPLE MANAGEMENT FACILITY GEOLOGIC LOG		Cuttings ☐ QA:QA	
Location (approximate): <u>N: 768199, E: 569271</u>		Core Size: <u>4.912"</u>		Revision # / Date: <u>Rev. 0, 10-14-2007</u>	
Elevation (approximate): <u></u> Inclination: <u>-90°</u>		Core From: <u>159.0'</u> To: <u>175.0'</u>		Date: <u>10/14/08</u>	
Bearing: <u>N/A</u> Rig: <u>GP24-300 S</u>		Logged By: <u>Pitterle</u> Date: <u>7-17-06</u>		Verified by (Printed Name/Signature): <u>Chris Lewis</u>	
Scale: <u>1 division = 1 ft.</u> TD: <u>311.2</u>		Hapkins		Date: <u>10/14/08</u>	

GRAPHIC:		VOLCANIC:		WELDING:	
Rubble 	Unrecovered 	Breccia 	Ignimbrite 	Lithophysal 	Bedded 
			Carbonate 	Alluvium 	Claystone 
			OTHER: 	Conglomerate 	Siltstone 
				Sandstone 	

Fracture Description/Remarks					Lithology Description/Remarks				
Date Drilled	Depth	Piece Length	Frequency	Graphic	Welding	Rock Type	Unit		
1	2	3	4	5	6	7	8	9	
7/18/06	159.0 2.1 2.1 161.1 4.1 4.1 165.2 4.4 4.5 169.7 5.6 5.6 173.7	N/A	N/A		Sonic Core		TPC P U n	Tiva Canyon Tuff, Crystal Poor Member, 155.0'-173.0' Nonlithophysal zone Pyroclastic flow: Densely welded, crystallized, reddish-gray (5R 6/1) to pale red (7.5 R 7/2); 2% pumice, white (2.5 Y 8/1), mostly 1x4 mm, up to 7x25 mm; no lithics observed; 1-3% crystal fragments of sanidine, plagioclase and < 1% biotite.	
							TPC P U I	173.0'-191.6' upper lithophysal zone Pyroclastic flow: Densely welded, crystallized,	

Note: All Blanks Are Intentional

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Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 9 of 16)

Borehole Name: <u>UE-25 RF #62</u>					SAMPLE MANAGEMENT FACILITY GEOLOGIC LOG (Continuation Page)					Cuttings ☐		Core ☒ <u>Sonic</u>		QA:QA
SMF ID: <u>1274</u>					From: <u>175.0'</u> To: <u>191.6'</u>									
Scale: <u>1 division = 1 ft.</u> TD: <u>311.2'</u>					Logged By: <u>Pitterle</u>		Date: <u>7-18-06</u>		Verified By (Printed Name/Signature): <u>Chris Lewis / Chris Lewis</u>		Date: <u>10/14/08</u>			
Fracture					Lithology									
Date Drilled	Depth	Piece Length	Frequency	Graphic	Fracture Description/Remarks	Welding	Rock Type	Unit	Lithologic Description/Remarks					
1	2	3	4	5	6	7	8	9	10					
7/18/06	-	N/A	N/A	-	Sonic Core			TPCPI	Upper lithophysal zone, as above Weak red (10 R 5/2); ~10% lithophysae up to 12cm, with ~20% light gray (N 8) vapor-phase alteration spots up to several cm; 3-5% pumice, white (2.5 Y 8/1), mostly 4x12mm, up to 4x20mm; no lithics observed; 1-2% crystal fragments of sanidine, plagioclase and <1% biotite.					
	-			-										
	-			-										
	-			-										
	-			-										
7/19/06	179.3													
	-													
	183.9													
	-													
	187.8													
	188.7													
	-													
	191.6													
	-				End of Sonic Core									
	-													
	-													

dm 10/17/08

Note: All Blanks Are Intentional

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Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 10 of 16)

Borehole Name: UE-25 RF #62 SMF ID: 1274		SAMPLE MANAGEMENT FACILITY GEOLOGIC LQG		Cuttings ☒ QA:QA			
Location (approximate):		Core Size: N/A		Core ☐			
Elevation (approximate):		Inclination: -90°		Revision # / Date: Rev. 0, 10-14-2008			
Bearing: N/A		Rig: GP24-300 RS		From: 191.6' To: 230.0'			
Scale: 10' Between Solid Lines TD: 311.2		Logged By: Pitterle		Date: 12-06-06			
		Verified by (Printed Name/Signature): Chris Lewis		Date: 10/14/08			
GRAPHIC: Rubble  Unrecovered  Breccia 		ROCK TYPE: VOLCANIC: Ignimbrite  Lithophysal  Vitrophyre  Bedded  SEDIMENTARY: Carbonate  Alluvium  Conglomerate  Claystone  Siltstone  Sandstone  OTHER:   					
		WELDING: Non  Partial  Moderate to Dense 					
		Fracture Description/Remarks Origin: Natural, Coring, Handling, Indeterminant. Dip: Angle between plane parallel to axis of core and plane of feature expressed in degrees. Fracture Line: Planar, Irregular, Curved, Stepped. Surface Characteristics: Smoothness, roughness, coatings, and fillings.					
		Lithology Description/Remarks Lithology: Unit, Member, Zone, Subzone. Matrix: Welding, alteration, color, other distinctive features. Pumice: %, color, alteration, size, aspect ratio. Lithophysae: %, rounding, size, alteration. Lithic clasts: %, color, size. Crystal Fragments: %, type or mineral (felsics, mafics).					
Date Drilled	Depth	Piece Length	Frequency	Graphic	Welding	Rock Type	Unit
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
7/19/06	191.6'				Cuttings Only		T
	200.0						P
	210.0						C
	220.0						P
	230.0						U
							I

Tiva Canyon Tuff, Crystal Poor Member
 Upper Lithophysal Zone
 From 191.6' - 258.0' Pyroclastic flow:
 Densely welded, crystallized, reddish-gray (2.5YR 5-6/1); 10-15% vapor-phase minerals from lithophysae; ~5% or less pumice, white (N9) to pinkish-gray (7.5YR 7-8/1); ~1% crystal fragments of sanidine and plagioclase, rare mafics of biotite & pyroxene (?); no lithics observed. Vapor-phase minerals decrease to ~5% between 240.0' and 248.2'.

Note: All Blanks Are Intentional

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Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 11 of 16)

Borehole Name: <u>UE-25 RF # 62</u>		SAMPLE MANAGEMENT FACILITY		Cuttings ☒ Core ☐ QA:QA		
SMF ID: <u>1274</u>		GEOLOGIC LOG (Continuation Page)		From: <u>230.0'</u> To: <u>248.2'</u>		
Scale: <u>10' Between Solid Lines</u> TD: <u>311.2'</u>		Logged By: <u>Pitterle</u>		Date: <u>12-06-06</u> Verified By (Printed Name/Signature): <u>Chris Lewis / Chris Lewis</u> Date: <u>10/14/08</u>		
Fracture			Lithology			
Date Drilled	Depth	Piece Length	Fracture Description/Remarks	Welding	Rock Type	Lithologic Description/Remarks
1	2	3	4	5	6	7
7/19/06	230.0					10
	240.0					Tiva Canyon Tuff, Upper Lithophysal Zone, as above
	248.2					
			End of Cuttings			

Note: All Blanks Are Intentional

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Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 12 of 16)

Borehole Name: <u>UE-25 RF #62</u> SMF ID: <u>1274</u>		SAMPLE MANAGEMENT FACILITY GEOLOGIC LQG		Cuttings ☐ QA:QA	
Location (approximate):		Core Size: <u>4.912"</u> Revision # / Date: <u>Rev. 0, 10-14-2008</u>		Core <u>Sonic</u> ☒ QA:QA	
Elevation (approximate):		Inclination: <u>-90°</u>		From: <u>248.2'</u> To: <u>264.1'</u>	
Bearing: <u>N/A</u> Rig: <u>GP24-300RS</u>		Logged By: <u>Pitterle</u> Date: <u>12-06-06</u>		Verified by (Printed Name/Signature): <u>Chris Lewis / Chris Lewis</u> Date: <u>10/14/08</u>	
Scale: <u>5' Between Solid Lines</u> TD: <u>311.2'</u>					

GRAPHIC:			ROCK TYPE:		
Rubble	Unrecovered	Breccia	VOLCANIC:	SEDIMENTARY:	OTHER:
			Ignimbrite	Carbonate	
			Lithophysal	Alluvium	
			Vitrophyre	Conglomerate	
			Bedded	Claystone	
			WELDING: Non	Siltstone	
			Partial	Sandstone	
			Moderate to Dense		

Fracture Description/Remarks					Lithology Description/Remarks				
Date Drilled	Depth	Piece Length	Frequency	Graphic	Origin: Natural, Coring, Handling, Indeterminant. Dip: Angle between plane parallel to axis of core and plane of feature expressed in degrees. Fracture Line: Planar, Irregular, Curved, Stepped. Surface Characteristics: Smoothness, roughness, coatings, and fillings.	Welding	Rock Type	Unit	Lithology: Unit, Member, Zone, Subzone. Matrix: Welding, alteration, color, other distinctive features. Pumice: %, color, alteration, size, aspect ratio. Lithophysae: %, rounding, size, alteration. Lithic clasts: %, color, size. Crystal Fragments: %, type or mineral (felsics, mafics).
1	2	3	4	5	6	7	8	9	10
7/26/06	248.2 2.2 2.8 251.0 4.5 4.6 255.6 3.3 3.9 258.5 1.3 3.6 262.1 0.8 6.0 264.1	N/A	N/A		Begin Sonic Core			TPC P U I	Tiva Canyon Tuff, Upper Lithophysal Zone, as above
								TPC P M N	258.0'-288.2' Tiva Canyon Tuff, Crystal Poor Member, Middle non-lithophysal zone. (See following page).
					End of Sonic Core				

Note: All Blanks Are Intentional

PA-PRO-0806.6-r0

Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 13 of 16)

Borehole Name: <u>UE-25 RF #62</u> SMF ID: <u>1274</u>					SAMPLE MANAGEMENT FACILITY GEOLOGIC LOG					Cuttings ☒ QA:QA			
Location (approximate):					Core					☐			
Elevation (approximate):					Inclination: <u>-90°</u>					Core Size: <u>N/A</u>			
Bearing: <u>N/A</u> Rig: <u>GP24-300 RS</u>					Revision # / Date: <u>Rev. 0, 10-14-2008</u>					From: <u>264.1'</u> To: <u>288.2'</u>			
Scale: <u>8' Between Solid Lines</u> TD: <u>311.2</u>					Logged By: <u>Pitterle</u> Date: <u>12-06-06</u>					Verified by (Printed Name/Signature): <u>Chris Lewis</u> Date: <u>10/14/08</u>			
GRAPHIC: Rubble  Unrecovered  Breccia 					ROCK TYPE: VOLCANIC: Ignimbrite  Lithophysal  Vitrophyre  Bedded  SEDIMENTARY: Carbonate  Alluvium  Conglomerate  Claystone  OTHER:   							WELDING: Non  Partial  Moderate to Dense 	
Fracture Description/Remarks					Lithology Description/Remarks								
Date Drilled	Depth	Piece Length	Frequency	Graphic	Origin: Natural, Coring, Handling, Indeterminant. Dip: Angle between plane parallel to axis of core and plane of feature expressed in degrees. Fracture Line: Planar, Irregular, Curved, Stepped. Surface Characteristics: Smoothness, roughness, coatings, and fillings.	Welding	Rock Type	Unit	Lithology: Unit, Member, Zone, Subzone. Matrix: Welding, alteration, color, other distinctive features. Pumice: %, color, alteration, size, aspect ratio. Lithophysal: %, rounding, size, alteration. Lithic clasts: %, color, size. Crystal Fragments: %, type or mineral (felsics, mafics).				
1	2	3	4	5	6	7	8	9	10				
7/27/06	264.1				Cuttings Only			T	Tiva Canyon Tuff, Crystal Poor Member				
								P	258.0'-288.2' Middle Nonlithophysal zone				
								C	Pyroclastic flow: Densely welded, Crystal-				
	272.0							P	lized, pale red (10R 6/2) mottled with				
								m	reddish-gray (10R 5-6/1); ~ 1% pumice,				
								n	light gray (10R 6/1) to gray (N7); rare				
	280.0								<<1% lithics, volcanic, dark reddish-				
									gray (10R 3/1), angular, 1mm; 1% felsic				
									crystal fragments, rare biotite, magnetite				
	288.2												
					End of cuttings								

Note: All Blanks Are Intentional

PA-PRO-0806.6-r0

Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 14 of 16)

Borehole Name: UE-25 RF # 62		SMF ID: 1274		SAMPLE MANAGEMENT FACILITY GEOLOGIC LOG				Cuttings ☐ QA:QA	
Location (approximate):				Core ☒					
Elevation (approximate):		Inclination: -90°		Core Size: HQ3(2.375")		Revision # / Date: Rev. 0, 10-14-2008		From: 288.2' To: 304.0'	
Bearing: N/A		Rig: GP 24-300RS		Logged By: Pitterle		Date: 7-31-06		Verified by (Printed Name/Signature): Chris Lewis Date: 10/14/08	
Scale: 1 division = 1'		TD: 311.2'							

GRAPHIC: Rubble Unrecovered Breccia			ROCK TYPE: VOLCANIC: Ignimbrite Lithophysal Vitrophyre SEDIMENTARY: Carbonate Alluvium Conglomerate Claystone Siltstone Sandstone OTHER:			WELDING: Non Partial Moderate to Dense		
---	--	--	---	--	--	---	--	--

Date Drilled	Depth	Piece Length	Frequency	Graphic	Fracture Description/Remarks	Welding	Rock Type	Unit	Lithology Description/Remarks
					Origin: Natural, Coring, Handling, Indeterminant. Dip: Angle between plane parallel to axis of core and plane of feature expressed in degrees. Fracture Line: Planar, Irregular, Curved, Stepped. Surface Characteristics: Smoothness, roughness, coatings, and fillings.				Lithology: Unit, Member, Zone, Subzone. Matrix: Welding, alteration, color, other distinctive features. Pumice: %, color, alteration, size, aspect ratio. Lithophyses: %, rounding, size, alteration. Lithic clasts: %, color, size. Crystal Fragments: %, type or mineral (felsics, mafics).
7/31/06	288.2 0.8 2.8 291.0	0.0	I		Vertical fract. along V.P. parting with V.P. mineral coating, clear, non-cryst.			T	Tiva Canyon tuff, crystal poor member, middle non-lithophysal zone. 288.2'-311.2'
	3.2 3.4 294.4	1.15	I		Generally clean, planar, slightly rough from 45° to 90° to core axis.			P	Pyroclastic flow: Densely welded, crystallized, weak red (2.5YR 5/2); 5-7% pumice,
	3.5 3.6 298.0	0.0	I		occasional near vertical, rough & irregular fract. with white non-cryst. to crystalline fill to 2mm			C	H. reddish-brown (2.5YR 6/4) (altered), cores of altered pumice are gray, moderate to high aspect ratios, up to 4mm; rare (~1%) lithics, gray, subrounded to rounded, up to 20mm; ~2-3% felsic crystal fragments, rare pyroxene(?), biotite and magnetite.
	3.2 5.0 303.0	1.83	I		white non-cryst. coating on planar fract.			P	Lithics are generally < 4mm. Matrix changes to light gray (2.5Y 7/1) with depth.
8/24/06	2.9 29		I		Intensely brecciated zone of what appears to be crushed or brecciated in place.				
					Fracts. are rough, irregular, with white				

Note: All Blanks Are Intentional

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Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 15 of 16)

[illegible]

Figure 15. Geologic Log of Drill Hole No. UE-25 RF#62 (Page 16 of 16)

MOL: 20070809.0356

Borehole Name: UE-25 RF#63 SMF ID: 1258		SAMPLE MANAGEMENT FACILITY GEOLOGIC LOG		Cuttings ☐ QA:QA	
Location (approximate): N 76°52'1.44" E 569613.67		Core Size: 4.91" Revision # /Date: Rev 0 / 7-31-07		Core ☒ QA:QA	
Elevation: 3760.8 approx. Inclination: -90°		From: 0.0' To: 16.0'			
Bearing: N/A Rig: GP24RS		Logged By: Hopkins Date: 8/15-16/05		Verified by (Printed Name/Signature): Chris J. Hermes / Chris J. Hermes Date: 7/13/07	
Scale: 1 division = 1ft TD: 229.2'					

GRAPHIC:		VOLCANIC:		WELDING:	
Rubble 	Unrecovered 	Breccia 	Ignimbrite 	Lithophysal 	Bedded 
			SEDIMENTARY:	Non 	Partial 
			Carbonate 	Alluvium 	Siltstone 
			OTHER: 	Conglomerate 	Sandstone 
				Claystone 	Fracture Filling 

Fracture Description/Remarks					Lithology Description/Remarks				
Date Drilled	Depth	Piece Length	Frequency	Graphic	Welding	Rock Type	Unit		
1	2	3	4	5	6	7	8	9	10
4/27/05	3.1	N/A	N/A		Sonic Core	0.0'	QTA	0.0' - 80.0' Alluvium (QTA).	
	3.1					0.0'		Alluvium consists of a mixture of gravel (30-50%), sand (30-40%) fines (silt/clay - 10-25%) and cobbles (25-15%). The fine sand to cobble size fragments consist primarily of moderately to densely welded crystal-poor and crystal rich tuff. Colors are gray (NS), white (2.5Y8/1), weak red (10R5/3), light gray (N7), reddish-gray (5R5/1), pink (7.5YR8/3), and pale red (2.5YR6/2). The finer sand and silt size fragments consist of welded tuff as above and lesser felsic crystal fragments and magnetite. The alluvium is unconsolidated and poorly sorted. Most of the	
	1.7	N/A	N/A		5.0' - 5.3' Fill	0.0'			
	1.9					0.0'			
	5.0					0.0'			
	6.2	N/A	N/A		11.2' - 11.7' Fill	0.0'			
	6.2					0.0'			
	11.2					0.0'			
	3.8	N/A	N/A		15.0' - 16.1' Fill	0.0'			
	3.8					0.0'			
	15.0					0.0'			

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Note: All Blanks Are Intentional

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Figure 16. Geologic Log of Drill Hole No. UE-25 RF#63 (Page 1 of 11)

INSTRUCTIONS FOR THE GEOLOGIC LOG

HEADER INFORMATION

Borehole Name: Unique designation for borehole.
 SMF ID: Unique identification number assigned by the SMF.
 Location (approximate): Approximate location (geographic feature, Exploratory Studies Facility stationing, alcove number, etc.); North and East State Plane, if known.
 Elevation: Elevation of borehole collar, if known.
 Inclination: Inclination of borehole, if known (Horizontal = 0°).
 Bearing: Bearing of borehole, if known.
 Rig: Drill rig type or model.
 Scale: Identify the scale used for the Depth column.
 TD (Total Depth): Depth of borehole at its completion.
 Core Size: Size designation of core drilled (NQ/HQ/PQ, etc).
 Revision and Date: Revision number of log upon completion of a Technical Review, and effective date of revision.
 Logged by and Date: Name of the SMF Geologist logging the core/cuttings, and the date logged.
 Cuttings/Core: Check appropriate box to indicate type of samples produced by drilling activity.
 From and To: Depth Interval represented by each page of the Geologic Log.
 Verified by and Date: Signature of the SMF Geologist who checked for accuracy and completeness and date verified.

COLUMN INFORMATION

1. Date(s) Drilled: Date(s) that the interval noted on the Geologic Log was drilled.
2. Depth: Depth notation of core runs (from borehole collar). Rotary borehole depths may be recorded as appropriate for the scale used.
3. Piece Length: Cumulative total of intact core pieces ≥ 0.33 foot, on a per run basis.
4. Frequency: Note fracture frequency (including natural and mechanical breaks) using the following letter descriptors:

Unfractured	No fractures in core run
Very slightly	Most pieces longer than 3 feet
Slightly	Core mostly in 1 to 3 feet lengths
Moderately	Core mostly in 4 inch to 1 foot lengths
Intensely	Pieces average 1 to 4 inches
Extremely	Recovery mostly chips and fragments
5. Graphic: Graphical representation of faults, fractures, broken core, and other structural features. Attitude of features should be sketched relative to the core axis at the appropriate depth. Use patterns provided in header to show breccia, rubble zones and unrecovered intervals.
6. Fracture Description/
Remarks: Brief description of faults, fractures and other structural characteristics including planarity, roughness, brecciation, and fill/coatings with approximate thickness.
7. Welding: Degree of welding. Use patterns provided in header.
8. Rock Type: Type of lithology encountered. Use patterns provided in header. "Other" patterns may be used for lithologies/rock types encountered which are not listed in the header.
9. Unit: *Indicate YMP lithostratigraphic unit.
10. Lithology Description/
Remarks: Includes contact depths, lithologic descriptions, and other observations related to geology/stratigraphy. Use the following format for lithologic descriptions:
 For footage intervals use the following format where X indicates depth, for example:
 XX.X' - XX.X' for complete descriptions of a member, unit, zone, or subzone.
 From XX.X' - XX.X' to describe changes or unique lithologies within units, zones or subzones of limited length.
 @ or Below XX.X' to describe local features or changes within units, zones or subzones.
 For the Descriptive Format (primarily for volcanic lithologies) use the following:
 *Unit Name (Formation/Member/Unit/Zone/Subzone), (if known)
 Lithology/type of deposit (ignimbrite, tephra, reworked, etc.): **Matrix/groundmass** welding, crystallization, alteration, color (use Munsell Soil Color Charts), foliation, bedding (thickness), sorting, grading and other distinctive features; % pumice, color, crystallization, alteration, aspect ratio, size; % **lithophysae**, shape, alteration, mineralization (vapor-phase), size; % **lithics**, color, lithology, rounding, size; % **felsic crystal fragments**, minerals; % **mafic crystal fragments**, minerals. List any other unique characteristics, such as the nature of contacts; (i.e., sharp, or gradational over XX feet).

* per Buesch, D. C., et al, "Proposed Stratigraphic Nomenclature and Macroscopic Identification of Lithostratigraphic Units of the Paintbrush Group Exposed at Yucca Mountain, Nevada," USGS OFR 94-469, 1996.

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Figure 16. Geologic Log of Drill Hole No. UE-25 RF#63 (Page 2 of 11)

Borehole Name: UE-25 RF #63				SAMPLE MANAGEMENT FACILITY				Cuttings ☐ Core ☒ QA:QA			
SMF ID: 1258				GEOLOGIC LOG (Continuation Page)				From: 16.0' To: 40.0'			
Scale: 1 division = 1 ft. TD: 229.2'				Logged By: Hopkins Date: 8-16-05				Verified By: Chris J. Hermes Date: 7-13-07			
Date Drilled		Fracture		Lithology		Fracture		Lithology			
1	2	3	4	5	6	7	8	9	10		
Depth	Piece Length	Frequency	Graphic	Fracture Description/Remarks	Welding	Rock Type	Unit	Lithologic Description/Remarks			
4/27/05	4.5/ 4.5	N/A	N/A	Sonic Core			Q	Alluvium as above			
	19.5			19.5'-20.4' F:11			T	larger fragments have caliche coatings.			
	4.3/ 4.3	N/A	N/A				a	from 0.0' - 1.7' Poorly developed soil, light brown (7.5YR 6/4). Approximately 50% fines (silt and clay), 30% sand, and 20% gravel. Minor organics (roots, leaves, twigs) scattered throughout the interval. The fines are non reactive with HCl. The are scattered caliche coatings on the larger rock fragments. The caliche is white (N9) and very pale brown (10YR 8/2) and is highly reactive with HCl.			
	23.8			23.8'-25.4' F:11							
	4.3/ 4.3	N/A	N/A								
	28.1			28.1' - 29.0' F:11							
	2.3/ 2.3	N/A	N/A								
	30.2										
	5.7/ 5.9	N/A	N/A					from 4.8' - 15.0' 5-10% cobbles of densely welded tuff.			
	36.3			36.5' - 37.3' F:11				@ 5.7' - 6.0' Cored cobble, greater than the diameter of the core. Vapor phase corroded densely welded crystal-poor tuff, dark reddish-gray (7.5R 4/1).			
	3.8/ 3.8	N/A	N/A					@ 13.7' - 14.0' Cored cobble, greater than the diameter of the core. Densely welded crystal-poor tuff, pale red (2.5YR 6/2).			
	40.1										

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Note: All Blanks Are Intentional

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Figure 16. Geologic Log of Drill Hole No. UE-25 RF#63 (Page 3 of 11)