APPENDIX B

MW-25 BORING/WELL CONSTRUCTION LOG AND MP CASING CONSTRUCTION DETAILS



Borehole Lo Project Loc Project #: G Geologist: Drilling Con Driller: Albo Reviewed b	ocation: JPL-MW-25 ation: NASA Jet Propulsion Lab 3486048 D. Conner tractor: WDC Exploration & Wells erto Vega by: David Clexton R.G. #7350	Sampler Type: Grab Sample from S Boring Diameter: 12 1/4" Drilling Method: Mud Rotary Drill Rig: Speedstar 50K Hammer Type: Casing Hamm Date: 09/20/04 - 09/24/04 Total Depth: 815' bgs	Shaker Screen	Coordinates (NAD 83 Surface Elevation: Borehole Abandoned Yes No X Method: N/A	<u>3/NA</u> I:	<u>VD 88)</u> N Y T N	North Eastir Ionitorir íes <u>X</u> ype: We Ionitorir	ing: 1,882,639.52 ng: 6,514,027.89 ng Device Installed: No estbay Multi-Port ng System
Depth (feet bgs)	Sample descr	iption	C	Comments	Lithology			Well Completion
	Asphalt Surface (4 inches thick	.)/				· . ·		Surface seal: 0-3' bas Concrete
5 SM	Silty SAND: reddish brown, dry, dense, fine- to medium-grained grained SAND, some gravel, so As above.	medium SAND, some coarse- me granitic cobbles.						Bentonite Seal: 1:1 granular bentonite to sand mixture 3 - 335' bgs
- 15 - - 15 - 	As above.							<u>Well Casing</u> : 4" Diameter Low-Carbon
20 -	As above.						家家家	Steel Casing 0 - 355' bgs
- 25 - - 	75% medium-grained, 25% fine- coarse-grained SAND.	grained, trace					家家家	
	coarse-grained SAND, trace silt	dium-grained SAND, 30%, 29-46' bgs (cobbles).	Moderate	rıg chatter.		影響	家家家	
- 35 - 	60% medium-grained, some co fine gravel up to 10mm long, tra	arse-grained SAND, ace silt.	Heavy rig	chatter.			深深が	
40	80% coarse-grained SAND, 20% subangular to angular, grains up	% fine-grained SAND o to 5mm long, trace silt.				家家家家	深深深淡	
SM	Silty SAND: coarse- to medium- angular, some cobbles.	grained SAND; angular to	Decrease	in rig chatter.		談	影	
50 -	Fine- to medium-grained SAND, grained.	some coarse-	Low rig ch	atter; easier drilling.			学校学校	
- 55 -	As above.					⑧	圆	
	Occassional cobbles.		Increase i bgs).	n rig chatter (59 - 61'		慾	家	



Borel Proje Proje Geole Drillir Drille Revie	Borehole Location: JPL-MW-25 Sampler Type: Grab Sample from Shaker Screen Coordinates (N/Surface Elevation Project Location: NASA Jet Propulsion Lab Boring Diameter: 12 1/4" Surface Elevation Project #: G486048 Drilling Method: Mud Rotary Surface Elevation Geologist: D. Conner Drill Rig: Speedstar 50K Hammer Type: Casing Hammer Driller: Alberto Vega David Clexton R.G. #7350 Date: 09/20/04 - 09/24/04 Ves No X			Coordinates (NAD 8: Surface Elevation: Borehole Abandoned Yes No X Method: N/A	<u>3/NA</u> 1:	<u>VD 88)</u> N Yi T	North Eastir Ionitorir es <u>X</u> ype: We Ionitorir	ing: 1,882,639.52 ng: 6,514,027.89 ng Device Installed: No estbay Multi-Port ng System	
Depth (feet bg	USCS Symbols	Sample descr	ption	Comm	ents	Lithology			Well Completion
- 60 -	SM	Silty SAND: coarse- to medium- subangular, some cobbles.	grained SAND; angular to	Lowrige	attor and again			影	
E]	Some fine-grained SAND, trace g	gravel.	drilling (6'	l - 66' bgs).		怒	影	
- 65 - -	GM	COBBLES with Silty SAND: fine coarse-grained SAND, some gra	- to medium-grained, some vel.	Increased	rig chatter at 66' bgs.				Bentonite Seal: 1:1 granular bentonite to sand mixture
- 70 		Some gravel and cobbles.						影響	3 - 335' bgs
- 75		70% coarse-grained SAND, 20% fine-grained, angular to subangu gravel.	6 medium-grained, 10% Ilar, some cobbles and	Heavy rig	chatter.		家窓		4" Diameter
- - 80 -	SM	Silty SAND: 60% fine- to mediur some coarse-grained.	n-grained SAND,	Viscosity: Weight: 8 Sand: 0.8	41seconds 9 lbs/ft ³ %			影響が	Low-Carbon Steel Casing 0 - 355' bgs
	GM	Gravel with Silty SAND: coarse- medium-grained SAND, angular	grained SAND, some fine-to to subangular.	Moderate	rig chatter.		廖		
F		60% medium-to coarse-grained	SAND, some gravel.	Increase i	n rig chatter at 86' bgs		該	影	
- -90	-	As above.					診察察	家家家	
- 95		70% medium- to coarse-grained grained SAND and some silt.	SAND, 30% fine-				認識が	が必須	
-100 	-	Gravel up to 15mm long.		Moderate	rig chatter.		影響		
		As above.					診察院	の変換	
-110 -		As above.		Increased	rig chatter.				
_ -115 -		As above.						家家家	
E 120							紁	影	



Borehole Project Lc Project #: Geologist Drilling Cc Driller: Al Reviewed	Dele Location: JPL-MW-25 t Location: NASA Jet Propulsion Lab t #: G486048 (Contractor: WDC Exploration & Wells Alberto Vega ved by: David Clexton R.G. #7350Sampler Type: Grab Sample from Shaker Screen Boring Diameter: 12 1/4" Drilling Method: Mud Rotary Drill Rig: Speedstar 50K Hammer Type: Casing Hammer Date: 09/20/04 - 09/24/04 Total Depth: 815' bgsCoordinates (NAD Surface Elevation Borehole Abandor Yes No X Method: N/A		Coordinates (NAD 83 Surface Elevation: Borehole Abandoned Yes No X Method: N/A	3/NA 1:	ND 88) N Y T	Northi Eastin Ionitorin es <u>X</u> ype: We Ionitorin	ng: 1,882,639.52 Ig: 6,514,027.89 Ig Device Installed: No estbay Multi-Port Ig System		
Depth (feet bgs)	symbols	Sample descri	ption	Comments	3	Lithology		,	Well Completion
-120	ĞΜ	COBBLES with Silty SAND: 80% SAND, 20% fine-grained SAND.	ώ medium- to coarse-grained	Moderate rig chatter	to moderately heavy		巡巡		
		As above.		Loss rig o	battor				Bentonite Seal: 1:1 granular bentonite to sand mixture 3 - 335' bgs
		Gravel and sparse cobbles. Gravelly SAND: 60% coarse-gra to medium-grained SAND.	ined SAND, 40% fine-	Less ng c			該該該	が必須	
-135	M	Silty SAND: fine- to medium-grai some coarse-grained SAND, we some grains 5-6mm long.	ned SAND, Il graded,						4" Diameter Low-Carbon Steel Casing 0 - 355' bos
		As above.							0 - 333 bys
-145-		60% medium- to coarse-grained grained SAND; angular to subar	SAND, 40% fine- gular.				家家	家家	
-150-		As above.		Low to m	oderate rig chatter.				
 155 		As above.						ががが	
	2.14	75% medium- to coarse-grained grained SAND, well graded.	SAND, 25% fine-						
-165-	5 191	SAND, 20% fine-grained SAND.		shaking.	n rig chatter and rig		該該	家家	
							巡巡	家家	
-170-		COBBLES and BOULDERS; cut SAND, 30% coarse-grained SAN	tings: 70% fine-grained ND.	Heavy rig advancing	chatter, drill bit g slowly through rock.		総派	家家	
		60% coarse-grained SAND, 40% medium-grained SAND, angular	δ fine- to to subangular.				家家派	家家家	
<u> </u> −180				I		1411		135/1	



Borehole Location: JPL-MW-25 Project Location: NASA Jet Propulsion Lab Project #: G486048 Geologist: D. Conner Drilling Contractor: WDC Exploration & Wells Driller: Alberto Vega Reviewed by: David Clexton R.G. #7350Sampler Type: Grab S. Boring Diameter: 12 Drilling Method: Mut Drill Rig: Speedstar Date: 09/20/04 - 09/ Total Depth: 815' bgs		from Shaker Screen tary lammer 4 Coordinates (NAD Surface Elevation: Borehole Abandon Yes No X Method: N/A		3/NA 1:	ND 88) N Y T N	Northing: 1,882,639.52 Easting: 6,514,027.89 Aonitoring Device Installed: 'es X No 'ype: Westbay Multi-Port Aonitoring System	
Depth O Sample d	escription	Comments	3	Lithology		١	Well Completion
Diller: Alberto Vega Reviewed by: David Clexton R.G. #7350 Depth (feet bgs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Date: 09/20/04 - 09/24/04 Total Depth: 815' bgs ascription 60% coarse-grained grained SAND; angular	Comments Increased Attempted sample (3 hammer), no recover	Method: N/A	Lthology			Bentonite Seal: 1:1 granular bentonite to sand mixture 3 - 335' bgs 4" Diameter Low-Carbon Steel Casing 0 - 355' bgs
					家巡	影影	
-240-1						13-11	



Boreho Project Project Geolog Drilling Driller: Review	ble Loca t Loca t #: G gist: I Cont Albe ved b	cation: JPL-MW-25 ation: NASA Jet Propulsion Lab 486048 D. Conner tractor: WDC Exploration & Wells rto Vega y: David Clexton R.G. #7350	Sampler Type: Grab Sample from 5 Boring Diameter: 12 1/4" Drilling Method: Mud Rotary Drill Rig: Speedstar 50K Hammer Type: Casing Hamm Date: 09/20/04 - 09/24/04 Total Depth: 815' bgs	Shaker Screen	Coordinates (NAD 83 Surface Elevation: Borehole Abandoned Yes No X Method: N/A	<u>3/NA</u> 1:	<u>VD 88)</u> N Y T	Northi Eastin Ionitorin es <u>X</u> ype: We Ionitorin	ng: 1,882,639.52 g: 6,514,027.89 g Device Installed: No estbay Multi-Port g System
Depth (feet bgs)	USCS symbols	Sample descri	ption	Comments	;	Lithology		١	Well Completion
	SM	Silty SAND: fine- to medium-gra some sporadic COBBLES.	ined; angular to subangular,						
-250-	-								Bentonite Seal: 1:1 granular — bentonite to sand mixture 3 - 335' bgs
	GM	COBBLES with silty SAND: 70% grained SAND, 30% fine-grained subangular. 80% medium- to coarse-grained 20% fine-grained SAND.	s medium to coarse- d SAND; angular to SAND and fine gravel,	Moderate	rig chatter.				
 260		60% coarse-grained SAND, 30% fine-grained SAND; angular to so gravel.	b fine gravel, 10% Jbangular					No. Contraction	4° Diameter Low-Carbon Steel Casing 0 - 355' bgs
 265 	-	As above.							
-270- 		As above.		Moderate	rig chatter.			影響	
275	SM	Silty SAND: 70% coarse-grained medium-grained SAND, angular no gravel.	SAND, 30% fine- to to subangular,	Low to mo	oderate rig chatter.				
-280- 	-	As above.				· · · · ·			
285- 	•	As above.							
-290-	-	Trace fine gravel.		Attomator	l split spoop				
295 	GM	As above. COBBLES with Silty SAND: 70%	coarse-grained SAND.	sample (3 hammer), recovery.	00lb. slide 100 blows, 2"		感影		
 300		30% fine- to medium-grained SA trace gravel. Increase in cobble	ND; angular to subangular, s.				紁	慾	

JPL-MW-25.CDR



Borehole L Project Lo Project #: Geologist: Drilling Co Driller: Alk Reviewed	Borehole Location: JPL-MW-25 Project Location: NASA Jet Propulsion Lab Project #: G486048 Geologist: D. Conner Orilling Contractor: WDC Exploration & Wells Driller: Alberto Vega Reviewed by: David Clexton R.G. #7350		Shaker Screen Coordinates (NAD 83/N. Surface Elevation: Borehole Abandoned: Yes No X. Method: N/A NA		3/NA 1:	<u>VD 88)</u> M Ye Ty M	Northi Eastin lonitorin es <u>X</u> ype: We lonitorin	ng: 1,882,639.52 g: 6,514,027.89 g Device Installed: No sstbay Multi-Port g System
Depth (feet bgs) ຫຼື	Sample descr	iption	Comments	;	Lithology		١	Well Completion
	 COBBLES with Silty SAND: 70% 30% fine- to medium-grained SA trace gravel. Increase in cobble As above. 	6 coarse-grained SAND, ND; angular to subangular, s.	Driller say drill bit bin	s it's very rocky, ding.		意志が変換が		Bentonite Seal: 1:1 granular — bentonite to sand mixture 3 - 335' bgs
-315-	As above. Decrease in cobbles.		Drill bit bir	nding, rig chatter.		が必要が必要が		4" Diameter Low-Carbon Steel Casing 0 - 355' bgs
-325-	As above.							
-330-si	 Gravelly SAND: tan to reddish b to coarse-grained SAND, 30% fi angular to subangular, trace fine As above. 	rown, 70% medium- ne-grained SAND; gravel.	Easier dril	ling.			家家家	_ Filter Pack:
- 340-GM	 COBBLES with Silty SAND: tan medium- to coarse-grained SAN SAND; angular to subangular. Increase in cobbles. 	to reddish brown, 70% D, 30% fine-grained						2/16 sand: 335 - 368' bgs
	As above. Trace gravel.		Some bit t	binding.				Well Screen #1: 355 - 365' bgs, 4" Diameter — 0.010-inch slot, wire-wrapped
-360			1		1111	- 8:36:E		SCREEN



Borehole Project Lc Project #: Geologist Drilling Cc Driller: Al Reviewed	Loc oca : G4 t: C ont lbei d by	cation: JPL-MW-25 tion: NASA Jet Propulsion Lab 486048 J. Conner ractor: WDC Exploration & Wells rto Vega y: David Clexton R.G. #7350	Sampler Type: Grab Sample from S Boring Diameter: 12 1/4" Drilling Method: Mud Rotary Drill Rig: Speedstar 50K Hammer Type: Casing Hamm Date: 09/20/04 - 09/24/04 Total Depth: 815' bgs	Shaker Screen	Coordinates (NAD 83 Surface Elevation: Borehole Abandoned Yes No X Method: N/A	<u>3/N</u> A	<u>ND 88)</u> N Y T N	North Eastir Ionitorir Ios <u>X</u> Ione: We	ing: 1,882,639.52 ng: 6,514,027.89 ng Device Installed: No estbay Multi-Port ng System
Depth (feet bgs) ອ	symbols	Sample descri	ption	Comments	3	Lithology			Well Completion
-360 - G 365 	5 5 M	COBBLES with Silty SAND: 70% SAND, 30% fine-grained SAND; trace gravel. As above.	, medium- to coarse-grained angular to subangular,	Bit binding Viscosity: Weight: 9. SAND: 0.7	J. 40 seconds. 0lbs/ft ³ 75%				Well Screen #1: 355 - 365' bgs, 4" Diameter
375- - 375- 		60% coarse-grained SAND, 40% grained SAND; angular. 70% coarse-grained SAND, 30% grained SAND; angular to subar	ο fine- to medium- δ fine- to medium- ngular, well graded.	Cuttings a above due through de comments competen	tre finer grained than to the bit grinding ense material. Driller that material is t.		ながないないない		4" Diameter Low-Carbon Steel Casing 365 - 420' bgs Bentonite Seal:
		As above. As above.					があるのである	が決定が決定	 Dentonite to sand mixture 368 - 407' bgs
	SM	As above. Silty SAND: 70% medium- to coa	arse-grained SAND,					家家家家	
-400- -400- -405- -405- -410- -410- -410- -415- 		30% fine-grained SAND. Gravels (406 - 414' bgs). As above. As above.		Moderate says hard	rig chatter. Driller material.			经经济经济经济	Filter Pack: Lonestar No. 2/16 sand: 407 - 435'
420									



Boreho Project Project Geolog Drilling Driller: Review	hole Location: JPL-MW-25 ect Location: NASA Jet Propulsion Lab act #: G486048 ogist: D. Conner mg Contractor: WDC Exploration & Wells er: Alberto Vega ewed by: David Clexton R.G. #7350Sampler Type: Grab Sample from Shaker Screen Boring Diameter: 12 1/4" Drilling Method: Mud Rotary Drill Rig: Speedstar 50K Hammer Type: Casing Hammer Date: 09/20/04 - 09/24/04 Total Depth: 815' bgsCoordinates (NAI Surface Elevation Borehole Abando Yes Method: N/A		Coordinates (NAD 83 Surface Elevation: Borehole Abandoned Yes No X Method: N/A	<u>3/N/</u> 1:	AV <u>D 88)</u> M Ye Ty M	Northi Eastir Ionitorir es <u>X</u> ype: We Ionitorir	ing: 1,882,639.52 ng: 6,514,027.89 ng Device Installed: No estbay Multi-Port ng System		
Depth (feet bgs)	USCS symbols	Sample descri	ption	Comments	3	Lithology			Well Completion
-420- 	sм	Silty SAND: 70% medium- to coa 30% fine-grained SAND.	arse-grained SAND,						<u>Filter Pack:</u> Lonestar No. 2/16sand: 407 - 435' bgs
425 430 	SM/ GM	Silty SAND with COBBLES: 60% SAND, 20% fine-grained SAND, As above.	 medium- to coarse-grained 20% COBBLES. 						Well Screen #2: 420 - 430' bgs, 4" Diameter
435		As above.							4" Diameter
	SM	Silty SAND: tan with some reddi 70% medium- to coarse-grained graded, some grains up to 2-3m As above.	sh orange grains, ; angular to subangular, well m in length						 Low-Carbon Steel Casing 435 - 500' bgs <u>Bentonite Seal</u>: 1:1 granular bentonite to sand mixture 435 - 490' bgs
 				Viscosity: Weight: 9 SAND: 1.5	39 seconds. 4 lbs/ft ³ . 5%				
 455 	SM/ GM	Silty SAND with COBBLES: 60% SAND, 20% fine-grained SAND,	nedium- to coarse-grained 20% COBBLES.					が必要が	
460	SM	Silty SAND: tan with red-orange medium-grained SAND, 30% fin- 10% coarse-grained, maximum	and gray, 60% e-grained SAND size <2mm.			•		が必須な	
		Tan. 50% medium grained SAN	0, 40% fine-grained	Viscosity	40 seconds			家家家	
 	-	SAND, 10% coarse-grained SAN	N, 40 / Inte-granted	Weight: 9 Sand: 1%	40 seconds lbs/ft ³			影響	
-475- 		As above.		Low rig ch no cobble speed of o	natter, softer material, s and higher rotationa drilling rod and bit.	. ' . ' - '	家家	家家家	
-480-						μĽ	1.1.7.	<u> </u>	



Borehole Project Lo Project #: Geologist Drilling Co Driller: Al Reviewed	Borehole Location: JPL-MW-25 Project Location: NASA Jet Propulsion Lab Project #: G486048 Geologist: D. Conner Drilling Contractor: WDC Exploration & Wells Driller: Alberto Vega Reviewed by: David Clexton R.G. #7350 Sampler Type: Grab Sample from Shaker Boring Diameter: 12 1/4" Drilling Method: Mud Rotary Drill Rig: Speedstar 50K Hammer Type: Casing Hammer Date: 09/20/04 - 09/24/04 Total Depth: 815' bgs		Shaker Screen	Coordinates (NAD 8 Surface Elevation: Borehole Abandoned Yes No X Method: N/A	3/N/ 1:	<u>AVD 88)</u> N Y T N	Northir Eastin Ionitorin íes <u>X</u> ype: We Ionitorin	ng: 1,882,639.52 g: 6,514,027.89 g Device Installed: No stbay Multi-Port g System	
Depth ທິ (feet bgs) ທິ	symbols	Sample descri	ption	Comments	3	Lithology		V	Vell Completion
-480	<u>"</u>	Sandy SILT: orange brown, dam some fine-grained SAND, trace r coarse-grained SAND (logged fre As above.	o, medium dense, nedium and trace om split-spoon sample).						Bentonite Seal: 1:1 granular — bentonite to sand mixture 435 - 490' bgs
-490-		As above.		Attempted	d split spoon				 4" Diameter Low-Carbon Steel Casing 435 - 500' bgs
-495-		As above.	modium to coarse areined	sample (3 hammer), recovery.	00 lb. Slide 100 blows, 6"				<u>Filter Pack</u> : Lonestar No. 2/16 sand: 490 - 518' bgs
G	ΞM	SAND, 30% fine-grained SAND; trace gravel. As above.	angular to subangular,						Well Sereen #2:
- 505-		As above.							4" Diameter 0.010-inch slot, wire-wrapped stainless-steel screen
s	SM	Silty SAND: fine- to medium-gra subangular, some coarse (up to	ined SAND; angular to 2-3mm).						
 515G 	M	COBBLES with Silty SAND: 70% SAND, 30% fine-grained SAND; trace gravel, grains up to 3mm, r	medium- to coarse-grained angular to subangular, noderately graded					1	
-520	M	Silty SAND: fine- to medium-grai coarse (up to 2-3mm); angular t As above.	ned SAND, some o subangular.						Bentonite Seal: 1:1 granular — bentonite to sand mixture 518 - 617' bgs
-530-		As above.					家家家家		 4" Diameter Low-Carbon Steel Casing 510 - 630' bgs
-535 - G	M	COBBLES with Silty SAND: 70% SAND, 30% fine-grained SAND; trace gravel, grains up to 3mm, i	6 medium- to coarse-grained angular to subangular, noderately graded				家族家族	が必要が	



Borehole L Project Loo Project #: (Geologist: Drilling Coi Driller: Alb Reviewed	Borehole Location: JPL-MW-25 Project Location: NASA Jet Propulsion Lab Project #: G486048 Geologist: D. Conner Drilling Contractor: WDC Exploration & Wells Drilling Contractor: WDC Exploration & Wells Priller: Alberto Vega Reviewed by: David Clexton R.G. #7350Sampler Type: Grab Sample from Shaker Screen Boring Diameter: 12 1/4" Drilling Method: Mud Rotary Drilling Speedstar 50K Hammer Type: Casing Hammer Date: 09/20/04 - 09/24/04 Total Depth: 815' bgsCoordinates (N Surface Elevati Borehole Aban Yes No 2 Method: N/A			Coordinates (NAD 8 Surface Elevation: Borehole Abandoned Yes No X Method: N/A	3/NA 1:	VD 88) N Y T N	Northi Eastin Ionitorin es <u>X</u> ype: We Ionitorin	ng: 1,882,639.52 ig: 6,514,027.89 ig Device Installed: No estbay Multi-Port ig System
Depth (feet bgs)	Sample descr	iption	Comments	3	Lithology		,	Well Completion
GN	COBBLES with Silty SAND: 70% SAND, 30% fine-grained SAND; trace gravel. As above.	b medium- to coarse-grained angular to subangular,						Bentonite Seal: 1:1 granular – bentonite to sand mixture 518 - 617' bgs
	 Poorly graded SAND with silt an grained SAND, 15% COBBLES, As above. 	d gravel: 75% fine- to coarse- 10% silt.	Increase i New shak	n rig chatter. er screen.				4" Diameter Low-Carbon
	As above.					巡	影	Steel Casing 510 - 630' bgs
SN	Silty SAND: tan brown, fine- to n SAND, some coarse-grained up angular to subangular, moderate	nedium-grained to 1mm in size; Ily graded.				該に	影響	
-565-	As above.					該	澎	
-570-	As above.						のないない	
-575-	Increase in coarse-grained SAN SAND.	D and medium-grained					影	
GN 580GN 585 	COBBLES with Silty SAND: 70% SAND, 30% fine-grained SAND; trace gravel. As above.	6 medium- to coarse-grained ; angular to subangular,					家家家家家家家家	
-590- -590-	As above.					変換数	が決定が	
 _595 	As above.							
F600						次	527	



Borehole Location: JPL-MW-25 Project Location: NASA Jet Propulsion Lab Project #: G486048 Geologist: D. Conner Drilling Contractor: WDC Exploration & Wells Driller: Alberto Vega Reviewed by: David Clexton R.G. #7350Sampler Type: Grab Sample fro Boring Diameter: 12 1/4" Drilling Method: Mud Rotar Drill Rig: Speedstar 50K Hammer Type: Casing Har Date: 09/20/04 - 09/24/04 Total Depth: 815' bgs			<u>3/NA</u> I:	<u>VD 88)</u> M Ye Ty	Northi Eastir Ionitorir es <u>X</u> ype: We Ionitorir	ng: 1,882,639.52 ig: 6,514,027.89 ig Device Installed: No estbay Multi-Port ig System
cription	Comments	;	Lithology		,	Well Completion
n- to coarse-grained SAND; angular to subangular,	Rig chatte Viscosity: Weight: 9 Sand: 1%	r. 41 seconds 1lbs/ft ³				Bentonite Seal: 1:1 granular bentonite to sand mixture 518 - 617' bgs 4" Diameter Low-Carbon Steel Casing 510 - 630' bgs
						2/16 sand: 617 - 643' bgs
	Attempt s sample (3 hammer), no recove	blit spoon 00lb. slide 100 blows, ry.				Well Screen #4: 630 - 640' bg, 4" Diameter 0.010-inch slot, wire-wrapped stainless-steel screen
ND.	Pig chatte	r (648 - 650')			下派法议	Bentonite Seal: 1:1 granular bentonite to sand mixture
D; subangular, some cobbles,	riy chatte	1 (040 - 030 <i>)</i> .				643 - 707' bgs 4" Diameter Low-Carbon Steel Casing 640 - 710' bgs
	Sampler Type: Grab Sample from S Boring Diameter: 12 1/4" Drilling Method: Mud Rotary Drill Rig: Speedstar 50K Hammer Type: Casing Hamm Date: 09/20/04 - 09/24/04 Total Depth: 815' bgs cription n- to coarse-grained SAND; angular to subangular, ND.	Sampler Type: Grab Sample from Shaker Screen Boring Diameter: 12 1/4" Drilling Method: Mud Rotary Drill Rig: Speedstar 50K Hammer Type: Casing Hammer Date: 09/20/04 - 09/24/04 Total Depth: 815' bgs cription Comments n- to coarse-grained SAND; angular to subangular, SAND; angular to subangular, Sand: 1% Rig chatte Viscosity: Weight: 9 Sand: 1% ND. ND. ND. Rig chatte	Sampler Type: Casb Same from Shaker Soren Boring Diameter: 12 1/4" Coordinates (NAD 8: Surface Elevation: Drilling: Speedstar 50K Hammer Type: Casib g Hammer Date: 09/20/04 - 09/24/04 cription Comments rotal Depth: 815' bgs Condinates (NAD 8: Surface Elevation: Dete: 09/20/04 - 09/24/04 cription Comments rotal Depth: 815' bgs Rig chatter. SAND; angular to subangular, SAND; angular to subangular, Rig chatter. Viscosity: 41 seconds Weight: 9.11bs/ft' Sand: 1% Sand: 1% ND. Attempt split spoon sample (500b. slide hammer), 100 blows, no recovery. ND. Rig chatter (648 - 650'). D; subangular, some cobbles, Rig chatter (648 - 650').	Sampler Type: Case Sample from Shaker Screen Boring Dameter: 21 214" Drilling Method: Mud Rotary Drill Rig: Speedstar 50K Hammer Type: Casing Hammer Date: 09/20/04 - 09/24/04 Total Depth: 815 bgs Coordinates (NAD B3/NA Surface Elevation: Surface Elevation: Surface Analysis in the surface and the surface and the surface Yes No X Method: N/A cription Comments Image: Casing Hammer Date: 09/20/04 - 09/24/04 r. to coarse-grained SAND; angular to subangular, Prig chatter: Rig chatter: Viscosity: 41 seconds Weight: 9.11bs/ft ¹ Sand: 1% Image: Casing Hammer Date: 09/20/04 - 09/24/04 ND. Attempt split spoon sample (300lb. slide hammer), 100 blows, no recovery. Image: Casing Hammer No blows, No recovery. ND. Rig chatter (648 - 650'). Image: Casing Hammer Side and the subangular, Hammer Sand: 1%	ND Sampler Type: Gas Sample ton Staker Screen Boring Diameter: 12 147 Coordinates (NAD 83/NAVD 88) Surface Elevation: Borchold Abandoned: Method: N/A Surface Elevation: Date: 02/02/04 - 092/40/4 Surface Elevation: Borchold Abandoned: Method: N/A M cription Comments Image: Surface Elevation: Borchold Abandoned: Method: N/A M n- to coarse-grained SAND; angular to subangular, SAND; angular to subangular, SAND; angular to subangular, SAND; angular to subangular, Rig chatter. Rig chatter. Viscosity: 41 seconds Weight: 9. 10s/ft [*] Sand: 1% Image: Surface Elevation: Method: N/A ND. Attempt split spoon sample (300b. side hammer), 100 blows, no recovery. Image: Surface Elevation: Method: N/A ND. Rig chatter (648 - 650'). Image: Surface Elevation: Method: N/A Display to subangular, Some cobbles, Rig chatter (648 - 650'). Image: Surface Elevation: Method: N/A	Bampler Type: Canci Sample from Shaker Screen Conditates (NAD 83) NAVD 88) North Barting Method: Mud Rolary Drill Rig: Speedstar 500 Total Depth: 815 bgs Monitoring Method: N/A Monitoring Weight in Monitoring Yes Monitoring Method: N/A Monitoring Yes ription Comments 0 0 0 n- to coarse-grained SAND; angular to subangular, Rig chatter. Viscosity: 41 seconds Weight: 91bs/ft* 0 0 ND, Attempt split spoon sample (300b, side hammer), 100 blows, no recovery. 1 0 0 ND, Rig chatter (648 - 650'). Rig chatter (648 - 650'). 0 0

JPL-MW-25.CDR



Borehole Lo Project Loc Project #: G Geologist: Drilling Cor Driller: Albo Reviewed b	Borehole Location: JPL-MW-25 Project Location: NASA Jet Propulsion Lab Project #: G486048 Geologist: D. Conner Drilling Contractor: WDC Exploration & Wells Driller: Alberto Vega Reviewed by: David Clexton R.G. #7350			Coordinates (NAD 83/NAVE Shaker Screen Surface Elevation: Borehole Abandoned: Yes Yes No X Method: N/A			88) Northing: 1,882,639.57 Easting: 6,514,027.89 Monitoring Device Installe Yes X No Type: Westbay Multi-Port Monitoring System		
Depth (feet bgs)	Sample descri	ption	Comments	3	Lithology		V	Vell Completion	
-660 GM 	COBBLES with Silty SAND: 70% SAND, 30% fine-grained SAND; trace gravel. As above.	medium- to coarse-grained angular to subangular,						<u>Bentonite Seal</u> : 1:1 granular – bentonite to sand mixture 643 - 707' bgs	
-675-SM	Silty SAND: fine- to medium-gra (2-3mm), moderately graded, su As above. As above.	ined, some cobbles bangular.	Viscosity: Weight: 9 Sand: 1%	39 seconds .2lbs/ft³				4" Diameter Low-Carbon Steel Casing 640 - 710' bgs	
	As above. As above.								
-700- GM -705- -705- -710- -710- -715- -720-	COBBLES with Silty SAND: 60% coarse-grained SAND; angular to length, some silt. As above. As above. As above .	o fine to medium-grained, 40% o subangular, up to 4 mm in	Heavy rig	chatter.				 <u>Filter Pack</u>: Lonestar No. 2/16 sand: 707 - 724' bgs <u>Well Screen #5</u>: 710 - 720' bgs, 4" Diameter 0.010-inch slot, wire-wrapped stainless-steel screen 	



Borehole Lo Project Loc Project #: G Geologist: Drilling Con Driller: Albe Reviewed b	ocation: JPL-MW-25 ation: NASA Jet Propulsion Lab i486048 D. Conner tractor: WDC Exploration & Wells erto Vega y: David Clexton R.G. #7350	Sampler Type: Grab Sample from S Boring Diameter: 12 1/4" Drilling Method: Mud Rotary Drill Rig: Speedstar 50K Hammer Type: Casing Hamm Date: 09/20/04 - 09/24/04 Total Depth: 815' bgs	Shaker Screen	Coordinates (NAD 83 Surface Elevation: Borehole Abandoned Yes No X Method: N/A	<u>3/NA</u> ` I:	VD 88) Northing: 1,882,639.52 Easting: 6,514,027.89 Monitoring Device Installe Yes X No Type: Westbay Multi-Port Monitoring System	<u>2</u> ed:
Depth (feet bgs)	Sample descr	ption	Comments	;	Lithology	Well Completion	
_720 	Silty SAND: 50% fine- to mediur coarse-grained SAND; angular t 4 mm in length.	n-grained, 50% o subangular, grains up to	Increase i	n rig chatter (722').			
-725-	As above.					Filter Pack: Lonestar No. 2/16 sand: 707 - 724' bg:	IS
-730-GM	SAND with COBBLES: 70% fine coarse-grained.	- to medium-grained, 30%	Heavy rig and bit bin (competer	chatter (COBBLES), ding. Very hard tt)			
 -735- 	As above.					4" Diameter	
-740-	As above.		Increased More com	rig chatter (741'). petent (742').		Steel Casing 720 - 740' bg Bentonite Seal: 1:1 granular]s <u> </u> :
 745	As above.					bentonite to sal mixture 740 - 815' bgs	nd
-750-	As above.						
 - 755- 	As above.						
	BEDROCK: buff to tannish pink, SAND; angular, some granodior biotite).	medium- to coarse-grained te grains (light colored with	Decrease bit binding speed and bedrock.	in rig chatter and , consistent rotational l pressure indicating			
765 	As above.						
-770-	As above.						
775 775 	Possible fractured and weathere	d BEDROCK.	Easier dril possibly d weathered	ling (775 - 780') ue to fractured or I zone in bedrock.			
-780]						<u>17757757</u>	



Borehole Location: JPL-MW-25 Project Location: NASA Jet Propulsion Lab Project #: G486048 Geologist: D. Conner Drilling Contractor: WDC Exploration & Wells Driller: Alberto Vega Reviewed by: David Clexton R.G. #7350		Sampler Type: Grab Sample from Shaker Screen Boring Diameter: 12 1/4" Drilling Method: Mud Rotary Drill Rig: Speedstar 50K Hammer Type: Casing Hammer Date: 09/20/04 - 09/24/04 Total Depth: 815' bgs		Coordinates (NAD 83/NAV Surface Elevation: Borehole Abandoned: Yes No X Method: N/A		<u>VD 88</u>) Northing: 1,882,639.52 Easting: 6,514,027.89 Monitoring Device Installed: Yes <u>X</u> No Type: Westbay Multi-Port Monitoring System	
Depth (feet bgs)	Sample descr	ption	Comments	3	Lithology	Well Completion	
(feet bgs) g g g 780 785 785 785 790 790 790 795 795 795 795 795 795 795 795 795 795	BEDROCK: buff to tannish pink, grained SAND, angular, some gr (light colored with biotite). As above. As above. As above. As above. As above. As above.	medium- to coarse- ranodiorite grains	Rig chatte indicating bedrock.	nd bit rotating at peed, slower ent.		Bentonite Seal: 1:1 granular bentonite to sand mixture 740 - 815' bgs	
- ₈₁₅ -	As above.					NANAN	
	ו.ט.: אוז' bgs.						

Summary Casing Log WDC

Job No: WB650 Well: MW-25



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Summary Casing Log WDC

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