APPENDIX 2-1: Original Windsor Well Completion and Boring Log

ROSCOE MOSS COMPANY

4360 WORTH STREET
LOS ANGELES, CAL.

WELL CONTRACTORS — RENTAL TOOLS

Log of Well No. 48 Drilled for Pasadena Water Department
Of Pasadena, California.
Exact Location 2696 Windsor Ave, Pasadena, California
Started Work March 28, 1969
Completed Work July 1, 1969
Total depth 600 Size of shoe 20 x 18 x 1-1/2" Conductor

50	ft. of	24	inch	1/4	or gauge casing used	and left in Well
600	" "	20	"	8	" " " " "	and " " "
	" "		"		" " " " "	" " "
	" "		"		" " " " "	" " "
	" "		"		" " " " "	" " "
	" "		"		" " " " "	" " "

Type of Perforator used Moss Hydraulic

Perforated	320	ft. to	344	ft.	10	Holes per	5	inches
"	374	" "	384	"	10	" "	5	"
"	426	" "	450	"	10	" "	5	"
"	474	" "	485	"	10	" "	5	"
"	497	" "	585	"	10	" "	5	"
"		" "		"		" "		"
"		" "		"		" "		"
"		" "		"		" "		"
"		" "		"		" "		"
"		" "		"		" "		"
"		" "		"		" "		"
"		" "		"		" "		"
"		" "		"		" "		"
"		" "		"		" "		"
"		" "		"		" "		"
"		" "		"		" "		"
"		" "		"		" "		"
"		" "		"		" "		"

Make diagram of perforation in square, showing dimensions.

Diameter of Perforations 3/16 inches
Length of Perforations 2-1/2 "
Depth at which water was first found 142 ft.
Standing level before perforating 180 "
Standing level after perforating 161 "

Note below your observation of any change in water level while drilling

Water level when first started Test 187 ft.
Draw down from standing level 57 "
No. of gallons per minute pumped when Test first started 850
No. of gallons per minute pumped when Test completed 1450
Draw down at completion of Test 88 ft.
Hours Testing Well 102

Formation: Mention size of water gravel—

0	ft. to	7	ft.	Soil
7	" "	60	"	Gravel and boulders
60	" "	146	"	Gravel, some sandy brown clay
146	" "	210	"	Very muddy sand and gravel
210	" "	270	"	Brown sandy clay, some gravel
270	" "	318	"	Brown sandy clay, streaks of
	" "		"	cemented gravel
318	" "	344	"	Sand and gravel [illegible]

No. of gallons per minute pumped when Test first started

No. of gallons per minute pumped when Test completed 1450

Draw down at completion of Test 88 ft.

Hours Testing Well 102

Formation: Mention size of water gravel—

0	ft. to	7	ft.	Soil
7	" "	60	"	Gravel and boulders
60	" "	146	"	Gravel, some sandy brown clay
146	" "	210	"	Very muddy sand and gravel
210	" "	270	"	Brown sandy clay, some gravel
270	" "	318	"	Brown sandy clay, streaks of cemented gravel
318	" "	344	"	Sand and gravel to 6"
344	" "	372	"	Hard brown clay, streaks gravel
372	" "	384	"	Gravel to 2", some brown clay
384	" "	400	"	Hard brown clay, some gravel
400	" "	408	"	Gravel to 2" and brown clay
408	" "	423	"	Hard brown clay and gravel
423	" "	451	"	Cemented sand, clay, and gravel 1-1/2"
451	" "	472	"	Hard sandy brown clay
472	" "	485	"	Sandy clay and gravel to 6"
485	" "	495	"	Hard sandy brown clay, some 1/2" gravel
495	" "	539	"	Tight sand and gravel to 10" some clay
539	" "	555	"	Cemented sand and gravel to 10" plus
555	" "	595	"	Sandy brown clay and gravel to 10" plus
595	" "	600	"	Hard conglomerate

If reducing strings of casing were cut off, state how cut

Depth from surface cut ft.

Size of casing cut in.

Lap in larger casing ft.

Was adapter or cement used?

If casing was swedged or repaired, state depth, describe repairs and condition in which casing was left and probable future effect:

Swaged casing from 0 to 595 feet with hydraulic swage.

Make drawing of adapter in square, showing dimensions.

Is well straight, top to bottom? Practically

If not, what is the variation?

Will there be any detrimental effect on pump? No

If so, what effect?

No. of tons of gravel installed in well

"	"	"	1-1/2"
451	" "	472 "	Hard sandy brown clay
472	" "	485 "	Sandy clay and gravel to 6"
485	" "	495 "	Hard sandy brown clay, some 1/2" gravel
495	" "	539 "	Tight sand and gravel to 10" some clay
539	" "	555 "	Cemented sand and gravel to 10" plus
555	" "	595 "	Sandy brown clay and gravel to 10" plus
595	" "	600 "	Hard conglomerate

If reducing strings of casing were cut off, state how cut

Depth from surface cut ..... **ft.**

Size of casing cut ..... **in.**

Lap in larger casing ..... **ft.**

Was adapter or cement used? .....

If casing was swedged or repaired, state depth, describe repairs and condition in which casing was left and probable future effect:

Swaged casing from 0 to 595 feet with hydraulic swage.

Make drawing of adapter in square, showing dimensions.

Is well straight, top to bottom? Practically

If not, what is the variation? .....

Will there be any detrimental effect on pump? No

If so, what effect? .....

No. of tons of gravel installed in well .....

Give any additional data which may be of future value Placed 11 sacks of neat cement in bottom of well. 8 lbs of H.T.H chlorine tablets in well. There was 25' of sand after pumping.

Driller must fill in report as work progresses and report must be complete for his successor.

Date of report July 7, 1969

Jack Cannon and J. Vervoorn.

Driller

Type and Rig No. used #44.

RM-11

CITY OF PASADENA

Pasadena, Calif.

Windsor Well No. 48

2696 Windsor Ave,
Pasadena, Calif.

July 1969

Cannon-Vervoorn.

F-111-17

APPENDIX 2-10: Daily Field Notes/Log Sheets for Well 52

MHTS Municipal Production Well Log Sheet - Well 52

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	GPM	Totalizer (x 100)		Daily Volume Purged (Gallons)	Generator Hour Meter		Comments
						Start	Finish		Beginning of Day	End of Day	
4.29.10	610/614	2:55	3:50	OEAL		017415	017466		003762	—	POWER PRIME PUMP HRS. 06615 1/10
4.29.10	614/634	4:26	5:06	OEAL		017466	017511		—	003762	STATIC WATER LEVEL 49 ft 4 1/2 in.
4.30.10	614/634	7:22	11:18	OEAL		017511	017832		003762	—	
4.30.10	634/634	12:40	1:32	OEAL		017832	017913		—	003820	
5.3.10 / 5.4.10	BOTTOM OF WELL	—	—	~~BAIL~~ BAIL		017913	017918		003820	003822	BAIL WATER AMOUNT TOTALIZER
5.4.10	250/260	1:19	1:30	DSAL		017918	017936		003822	—	
5.4.10	260/270	2:00	2:11	DSAL		017936	017952		—	—	
5.4.10	270/280	2:20	2:30	DSAL		017952	017969		—	—	
5.4.10	280/290	2:58	3:08	DSAL		017969	017988		—	—	
5.4.10	290/300	3:16	3:26	DSAL		017988	018006		—	—	
5.4.10	300/310	3:43	3:55	DSAL		018006	018026		—	—	
5.4.10	310/320	4:07	4:18	DSAL		018026	018046		—	003849	
5.5.10	320/330	7:45	7:55	DSAL		018046	018064		003849	—	ZONE 320-330
5.5.10	330/340	8:03	8:15	DSAL		018064	018086		—	—	
5.5.10	340/350	8:33	8:40	DSAL		018086	018106		—	—	
5.5.10	350/360	9:02	9:15	DSAL		018106	018129		—	—	
5.5.10	360/370	9:45	9:56	DSAL		018129	018146		—	—	
5.5.10	370/380	10:06	10:19	DSAL	↓	018146	018170		—	—	

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

180
56

MHTS Municipal Production Well Log Sheet - Well 52

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	GPM	Totalizer (x 100) Start	Totalizer (x 100) Finish	Daily Volume Purged (Gallons)	Generator Hour Meter Beginning of Day	Generator Hour Meter End of Day	Comments
5-5-10	380/390	10:37	10:49	DSAL		018170	018188		003549	—	
5-5-10	390/400	10:59	11:10	DSAL		018188	018213		—	—	
5-5-10	400/410	12:24	12:37	DSAL		018213	018233		—	—	
5-5-10	410/420	12:47	12:57	DSAL		018233	018251		—	—	
5-5-10	420/430	1:16	1:29	DSAL		018251	018271		—	—	
5-5-10	430/440	1:40	1:51	DSAL		018271	018290		—	—	TOTALIZER 018290
5-5-10	440/450	2:17	2:28	DSAL		018290	018311		—	—	
5-5-10	450/460	2:43	2:54	DSAL		018311	018330		—	—	
5-5-10	460/470	3:13	3:25	DSAL		018330	018349		—	—	
5-5-10	470/480	3:35	3:47	DSAL		018349	018368		—	—	
5-5-10	480/490	4:01	4:12	DSAL		018368	018384		—	003935	
5-6-10	490/500	8:10	8:14	DSAL		018384	018404		003935	—	TOOK SAMPLES from WELL 7:43AM.
5-6-10	500/510	8:30	8:44	DSAL		018404	018423		—	—	
5-6-10	510/520	8:54	9:08	DSAL		018423	018446		—	—	
5-6-10	520/530	9:25	9:37	DSAL		018446	018465		—	—	
5-6-10	530/540	9:47	9:58	DSAL		018465	018485		—	—	
5-6-10	540/550	10:14	10:30	DSAL		018485	018513		—	—	ZONE 540-550
5-6-10	550/560	10:41	10:52	DSAL	✓	018513	018530		—	—	ZONE 550-560
Notes: OEAL = Open End Air lift DSAL = Dual Swab Air lift SP = Submersible Pump											
5-6-10	560/570	11:04	11:18	DSAL		018530	018552		—	—	ZONE 560-570
5-6-10	570/580	12:15	12:24	DSAL		018552	018568		—	—	ZONE 570-580
5-6-10	580/590	12:37	12:49	DSAL	✓	018568	018584		—	—	ZONE 580-590

MHTS Municipal Production Well Log Sheet - [redacted] WELL 52

Date	Zone	Pump Start Time	Pump Finish Time	Method[1]	GPM	Totalizer Start	Totalizer Finish	Daily Volume Purged (Gallons)	Generator Hour Meter Start	Generator Hour Meter Finish	Fuel Level Start	Fuel Level Finish	Comments
5-6-10	590/600	12:56	1:08	DSAL		018584	018604		003935	—			
5-6-10	600/610	1:21	1:31	DSAL		018604	018620		—	—			
5-6-10	610/620	1:39	1:50	DSAL		018620	018638		—	—			
5-6-10	620/630	2:02	2:48	DSAL		018638	018699		—	004001			BROWN WATER CONT'D PUMPING to Clear
5-14-10	631/642	1:15	1:38	OEAL		018699	018718		004022	004028			mixed Soda Ash to NEUTRALIZE Acid.
5-17-10	631/642	11:00AM	1:30	OEAL		018718	018920		004022	—			Checking PH Before transfer to WEIR TANK.
5-24-10	250/260	12:45	—	DSAL		018920	—		—	004045			PH = 7 CONT'D PUMPING
5-24-10	260/270	—	2:58	DSAL		—	019119		—	—			Stop Pumping
5-24-10	270/280	3:22	4:15	DSAL		019119	019195		—	004091			
5-25-10	270/280	7:45	—	DSAL		019195	—		004091	—			PH 6.0
5-25-10	280/290	8:10	9:00	DSAL		—	019313		—	—			
5-25-10	290/300	9:33	—	DSAL		019313	—		—	—			
5-25-10	300/310	10:50	11:30	DSAL		—	019481		—	—			
5-25-10	310/320	12:30	—	DSAL		019481	—		—	—			
5-25-10	320/330	1:40	2:34	DSAL		—	019672		—	—			PH - 7.0
5-25-10	336/340	2:57	3:45	DSAL		019672	019720		—	004167			GENERATOR NEED REFUELING
5-26-10	350/360	7:40	8:04	DSAL		019720	019768		004167	—			
5-26-10	360/370	8:05	8:30	DSAL		019768	019805		—	—			Next Page

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Well 52

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	GPM	Totalizer (x 100)		Daily Volume Purged (Gallons)	Generator Hour Meter		Comments
						Start	Finish		Beginning of Day	End of Day	
5-26-10	370/390	9:12	9:50	DSAL		019805	019854		004167	—	
5-26-10	393/413	10:05	10:45	DSAL		019854	019886		—	—	
5-26-10	413/423	11:15	11:47	DSAL		019886	019930		—	—	
5-26-10	424/444	12:30	1:20	DSAL		019930	019999		-	—	PH = 7
5-26-10	455/476	2:20	2:47	DSAL		019999	020041		-	—	
5-26-10	476/486	3:30	4:04	DSAL		020041	020075		[redacted]	004250	TANK 1 18,012 / TANK 2 18,974 / TANK 3 19,545 gallons

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Well 52

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100)		Generator Hour Meter		Comments
							Start	Finish	Beginning of Day	End of Day	
5·27·10	497-507	7:40	8:00	DSAL	20		020075	—	004255	—	light Brown Cloudy
5·27·10	507-517	8:00	8:17	DSAL	17		—	020129	—	—	Rolloff Full / TANK 1,2,3 FULL
5·27·10	517-527	8:50	9:05	DSAL	15		020129	—	—	—	PH=6.5
5·27·10	527-538	9:05	9:35	DSAL	30		—	020192	—	—	PH=7.0
5·27·10	538-548	10:05	10:27	DSAL	22		020192	—	—	—	PH=7.5
5·27·10	548-558	10:27	10:50	DSAL	23		—	020253	—	—	PH=7.0
5·27·10	558-568	11:18	11:35	DSAL	17		020253	—	—	—	
5·27·10	568-578	11:35	12:00	DSAL	25		—	020306	—	—	
5-27-10	578-588	12:05	12:25	DSAL	20		020306	—	—	—	
5-27-10	588-598	12:25	12:40	DSAL	15		—	020349	—	—	
5·27·10	599-620	1:20	1:38	DSAL	18		020349	—	—	—	
5·27·10	620-640	1:38	1:57	DSAL	19		—	020383	—	004343	END(DSAL)

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

619-726-7311

Layne Christensen Co. — Test Pump Data

Page 1 of ___

Customer BATTELLE J.P.L. Date 8-31-10 Job Number 1000-1968

Well Diameter 20" Depth of Well ___ Static Water Level 58.0' Well # and Name #52

Pump Setting ___ Airline Depth 406.5' Flowmeter: Start 096.600 End 097.214

How Q Measured 18" METER How W.L.s measured AIRLINE ELECT Test Type: Development___ StepDraw-Down___ Production___

Total Hours This Sheet ___ Person Conducting Well Test ___

200,058.8 GAL. PUMPED

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
8:40	FIRST START NEARLY CLEAR						P.H. 6.5
9:45	2.0 212.0 PPM	670	17.0'	75.0'	39.41	836	VERY CLOUDY
9:55							
10:00	3.8 63.6 PPM	675	18.4'	76.4'	36.68		ORANGE
10:01		1000				994	INC. Q SLIGHT CLOUDY ORANGE
10:06	5.4 169.6 PPM	1000	29.0'	87.0	34.48	994	NEARLY CLEAR LIGHT ORANGE P.H 7.0
10:26	7.2 47.7 PPM	1000	30.2'	88.2	33.11	994	NEARLY CLEAR TINY BIT OF AIR P.H. 7.0
10:45							THROATLE TO 500 ALMOST CLEAR
10:55	2.0 36.5	500	17.6'	75.6	28.40	996	CLEAR 54 LBS DISC.
#1	PACKER TOP 300' 115.0 LBS						
#2	PACKER BOTTOM 365' 135.0 LBS						
	AIRLINE 406.5' 150.0 LBS ELECT 60'						
2:06	START FOR AIR CONSENTRATION TEST						CLOUDY
2:11	1.2 127.2 PPM	1010	27.4'	85.4'	36.86		LIGHT CLOUDY
2:15	SHUT DOWN						
2:31	RESTART @ 1000 G.P.M.						LIGHT BROWN-YELLOW MICA
2:41	2.4 127.2 PPM	1005	26.2'	84.2'	38.35	997	VERY CLOUDY
2:51	3.2 42.4 PPM	1000	27.2'	85.2	36.76	997	NEARLY CLEAR
3:01	3.5	1000	28.1'	86.1'		997	AIR CONT. 35.0 PPM .5 cc
3:05	TOP PACKER INFLATED 115 LBS.						
3:15	4.0 17.0 PPM	1000	28.2'	86.2'	35.46	997	SLIGHT CLOUDY
3:35	4.2 10.6 PPM	1000	28.4'	86.4'	35.21	997	" " 20.0 PPM
3:37	AIR UP BOTTOM PACKER 135 LBS.						AIR CONTENT PPM .3 cc CLEAR
3:52	4.5 9.35 PPM	1000	28.5'	86.5'	35.08	997	CLEAR
4:07	4.6 3.53	1000	28.55	86.55	35.02	997	CLEAR 21.7 PPM .3 cc

13,800 cc
1200 M.L. BOTTLE
11.5 cc = 1 ML

VISUAL = VERY SMALL AMT. AIR. WOULD EASILY DISIPATE IN FOREBAY WOULD NOT CAUSE PUMP DAMAGE.

Layne Christensen Company

Date: 9-1-10 Page _____

Customer: BATTELLE / JPL. WELL #52 Job No. 27-1000-1968

Meter 8" X 520 Static level 60.53 Feet Airline depth _____ Feet

Hours/Page _____ Total hours _____ G.P.D. 388,311.2

Operator: J. ALBA

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments	FAU	TSS
8:30			60.53				METER READING 97213.8		
Start 9:20									
9:30	66.25	1098.62	89.32	28.79	998	38.15	CLR 247.5		
9:45	24.73	1075.8	90.5	29.97	998	35.89	CLR 297.0		
10:00	31.8	1064.93	91.76	31.23	998	34.09	CLR 346.0		
10:15	9.93	1055.22	92.34	31.81	998	33.17	CLR 397.8		
10:30	7.57	1057.17	92.53	32.0	998	33.03	CLR 443.2		
10:45	7.77	1071.45	92.89	32.36	998 Qt	33.11	CLR 492.5		
10:58	195.69	1517.45	—	—	—	—	CLR 553.0		
							SHUT DOWN TANKS OVERFLOWING.		
12:56		RESUME	Pumping				554.4		
1:00	NA	—	—	—	—	—	567.4		
1:15	64.35	1067.10	92.9	32.37	998 Qt	32.96	INCREASE FLOW TO 1500GPMS 616.5		
1:30	113.06	1532.2	111.76	51.23	1271	29.90	CLR 687.0		
1:45	56.53	1532.2	113.4	52.87	1271	28.98	CLEAR 757.5		
2:00	21.2	1521.33	114.18	53.65	1271 Qt	28.35	CLR DECREASE TO 1000 GPMS. 827.5		
2:15	21.2	1064.93	96.9	36.37	997	29.28	CLR 876.5		
2:22							INCREASE TO 1500GPMS 899.4		
2:37	35.3	1532.2	114.9	54.37	1268	28.18	CLR 97969.9		
2:52	1378	1512.621	115.43	54.9	1268 Qt	27.55	CLR INCREASE TO 1800 GPM 98039.5		
3:07	98.93	1797.34	129.3	68.77	1447	26.13	CLR 122.2		
3:12					Qt		DECREASE TO 1500 GPMS. 148.4		
3:27	24.73	1495.25	118.6	58.07	1267	25.74	CLR 217.2		
3:42	24.73	1495.25	118.71	58.18	1269	25.70	CLR 286.0		
3:45							INCREASE FLOW TO 1800 300.0		
3:56	43.36	1807.81	131.2	70.67	1450	25.58	CLR 361.0		
4:11							SHUT DOWN FINAL TOTALIZER 98405.0		

Layne Christensen Company

Date: 9-2-10 Page _____

Customer: BATTELLE WELL #52 Job No. ~~27~~ A-1000-1968

Meter 8 X 326 Static level 61.37 Feet Airline depth 406.5 Feet

Hours/Page _____ Total hours _____ G.P.D. 488,608.8

Operator: J. ALBA

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments		FAU	TSS
7:00			61.37				METER READING	98405.2		
START 8:00					1007		CLR	452.8		
8:15	49.46	1034.50	93.75	32.38	1007	31.94	CLR	452.8		
8:25							CHANGE FLOW TO 1800 GPMS	490.3		
8:40	113.0	1049.72	97.63	36.26	1016	28.94	CLR	538.6		
8:55	53.	1051.89	97.91	36.54	1016	28.78	CLR	587.0		
9:10	12.36	1047.54	98.35	36.96	1016 OK	28.34	CLR	635.2		
9:25	77.73	1732.14	129.8	68.43	1456	25.31	CLR	714.9		
9:40	45.93	1823.42	131.72	70.35	1456	25.91	CLR	798.8	AIR .5 cc 20 PPM	
9:55	42.4	1819.08	132.68	71.31	1456	25.50	CLR INFLATE (PACKER #1 TOP)	882.5		
10:10	31.8	1812.56	131.9	70.53	1457	25.69	CLR	98965.9		
10:25	19.43	1808.21	129.3	67.93	1457	26.61	CLR INFLATE (PACKER #2 BOTTOM)	99049.1		
10:42							THROTTLE DOWN TO 1300 GPMS.	141.4		
10:55								197.2	AIR .5	
11:10	24.73	1812.56	131.61	70.24	1458	25.80	CLR	280.0		
11:25	22.96	1812.56	131.61	70.24	1458	25.80	CLR	364.0	AIR .5	
1:30			RESUME	PUMPING				424.9		
1:45	42.4	1049.72	97.35	35.98	1011		CLR	473.2		
			SURGE X 5							
1:49			RESUME	PUMPING				474.8		
2:04	35.3	1047.54	97.08	35.71	1011	29.33	CLR	523.0		
2:19	10.6	1032.33	97.52	36.15	1011	28.55	CLR	570.5		
			SURGE X 5							
2:23			RESUME	PUMPING				572.1		
2:38	31.8	1038.85	97.20	35.83	1011	28.99	CLR	619.9		
2:53	11.30	1021.46	97.5	36.13	1011	28.27	CLR	666.9		
			SURGE X 5							
2:57			RESUME	PUMPING				668.0		
3:12	19.46	1021.46	97.15	35.78	1011	28.54	CLR	715.0		
3:27	14.13	1021.46	97.46	36.09	1011	28.30	CLR	762.0		
			SURGE X 5							
3:30			RESUME	PUMPING				764.5		
3:45	70.66	1519.16	111.29	55.92	1274	27.16	CLR	834.4		
4:00	35.33	1501.77	118.55	57.18	1274	26.26	CLR	903.5		

Layne Christensen Company

Date: 10-23-10 Page _____

Customer: BATTELLE #52

Job No. 27-1000 1968

Meter 8 x 325.8

Static level 53.40 Feet

Airline depth _____ Feet

Hours/Page 6

Total hours _____

G.P.D. 293,546

Operator: WEBER

Redevelop

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments	FAU	TSS
9:00		* gravel @ 23'					Surging well - meter 99903		
:42	Start pumping								
10:00	9.4	700	84.76'	31.36'	960	22.3	Clring - Surge x5		
:05	resume								
:25	5.6	700	86.18'	32.78'	960	21.4	Clr - S x5 - pH 7.4	5	14
:30	resume								
:50	4.2	700	86.43'	33.03'	960	21.2	Clr - S x5		
:55	resume								
11:15	10.9	1000	99.15'	45.75'	1100	21.9	Clr - S x5	4	
:20	resume								
:40	37.9	950	99.65'	46.25'	1100	20.5	Clr - S x5		
:45	resume		* gravel @		24'				
12:05	22.7	950	99.77'	46.37'	1100	20.5	Clr - S x5		
:10	resume								
:30	22.3	900	100.10'	46.70'	1100	19.3	Clr - S x5		
:35	resume								
1:05	53.0	1175	114.61'	61.21'	1235	19.2	Clr - S x5		
:10	resume								
:30	94.8	1150	115.35'	61.95'	1235	18.6	Clr - S x5		
:35	resume								
:55	48.8	1150	115.60'	62.20'	1235	18.5	Clr - S x5		
2:00	resume								
:20	39.1	1150	115.70'	62.30'	1235	18.5	Clr - S x5		
:25	resume								
:45	36.3	1150	116.50'	63.10'	1235	18.2	Clr - S x5		
:50	resume								
3:10	33.5	1150	116.16'	62.76	1235	18.3	Clr - Shutdown		
	gravel @		24.20'				100804 ← meter		

Layne Christensen Co. **Test Pump Data** Page 1 of ___

Customer BATTELLE J.P.L. Date 10-26-10 Job Number 1000 - 1968

Well Diameter 20" Depth of Well 647' Static Water Level 58.4' Well # and Name #52

Pump Setting 235' (INNER) Airline Depth 250' TOP OF SCREEN Flowmeter: Start 099903.000 End ___ 100.805 AC FT.

How Q Measured 8" McCROM How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down___ Production___

Total Hours This Sheet ___ Person Conducting Well Test ___

BLANK 367'-372 630' BOTTOM OF SCREEN 647' BOTTOM OF HOLE

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
							STATIC TOP OF CASING 58.4'.
8:30	SURGING WELL						
8:43	START AFTER 4 SURGES						
8:50	RESTART						ALMOST CLEAR
9:10	30 PPM	1150	40.2'	98.6'	28.60	1209	CLEAR
9:16	START AFTER 4 SURGES					1218	CLOUDY YELLOW
9:36	1.1 cc 30 PPM	1120	41.8'	100.2'	26.79	1218	CLEAR
9:41	START AFTER 3 SURGES						CLOUDY YELLOW - BROWN
10:01	1.0 cc 26.5 PPM	1200	44.6'	103.0	26.90	1239	CLEAR
10:09	START AFTER 4 SURGES LIGHT CLOUDY						
10:29	4.1 cc 108.6 PPM	1400	52.5'	110.9'	26.66	1329	CLEAR
10:34	START AFTER 4 SURGES					VERY CLOUDY LIGHT BROWN	
10:54	3.1 82.1 PPM	1430	52.7'	111.1'	27.13	1329	CLEAR
11:00	START AFTER 4 SURGES					VERY CLOUDY	
11:20	2.2 cc 58.3 PPM	1440	53.4'	111.8'	26.96	1329	CLEAR SAND CONTENT SMALL SMALL BROWN SILT & LOTS OF MICA
11:26	START AFTER 3 SURGES					VERY CLOUDY	
11:46	2.0 cc 53 PPM	1511	59.6'	118.0'	25.35	1388	CLEAR
11:58		INCREASE FLO				1510	INC. Q
12:18	45 PPM	1730	79.1'	137.5'	22.12	1510	CLOUDY
12:32		START AFTER 6 SURGES				VERY CLOUDY	
12:52	6.0 159 PPM	1420	55.9'	114.3'	25.40	1329	LIGHT CLOUDY
1:04	START AFTER 7 SURGES						CLOUDY
1:24	3.0 79 PPM	1440	54.5'	112.9'	26.42	1331	CLEAR
1:33	START AFTER 4 SURGES						SLIGHTLY CLOUDED MICA
1:53	2.5 66.2 PPM	1443	54.5	112.9	26.47	1331	CLEAR

Layne Christensen Co.

Test Pump Data

Page ___of___

Customer BATTELLE J.P.L. Date 10-26-10 Job Number 1000-1968

Well Diameter 20" Depth of Well 647.0' Static Water Level 58.4' Well # and Name #52 J.P.L.

Pump Setting 235' Airline Depth 250' TOP OF SCREEN Flowmeter: Start _____ End 102.288

How Q Measured 8" McCROM How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down___ Production___

Total Hours This Sheet 7.25 HRS. Person Conducting Well Test PORTER

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
1:58	START AFTER 4 SURGES						CLOUDY
2:18	4.6 80 PPM	1500	59.7'	118.1'	25.12	1389	CLEAR
2:28	START AFTER 5 SURGES						CLOUDY 4 MINS.
2:48	78 PPM	1504	60.2'	118.6	24.98	1389	CLEAR
2:53	START AFTER 4 SURGES						VERY CLOUDY 4 MINS
3:13	3.3 87 PPM	1660	68.4'	126.8'	24.26	1467	CLEAR
3:20	START AFTER 5 SURGES						CLOUDY YELLOW MICA
3:40	3.2 84.8 PPM	1665	68.6'	127.0'	24.27	1467	CLEAR SMALL AMT AIR
							489,204 GAL. PUMPED

Layne Christensen Co. **Test Pump Data**

Customer BATTELLE J.P.L. Date 10-27-10 Job Number 1000-1968

Well Diameter 20" LINNER Depth of Well 647' Static Water Level 58.1' Well # and Name #52

Pump Setting 235' Airline Depth 250' TOP OF SCREEN Flowmeter: Start 102288 End

How Q Measured 8" MTR A.F. X.001 How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down___ Production___

Total Hours This Sheet ___ Person Conducting Well Test ___

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
3.5							
8:30	SURGING	WARM	UP GREASE			5 SURGES	
8:35	FIRST	START					CLOUDY
8:55	4.2 18 PPM	1410	51.1'	109.2'	27.59	1324	CLEAR
9:03		START	AFTER 4	SURGES			SLIGHT CLOUDYNESS
9:23	.7cc 18.5 PPM	1445	52.7'	110.8'	27.41	1332	CLEAR
9:28		START	AFTER 4	SURGES			CLOUDY YELLOW
9:48	1.5cc 21 PPM	1575	57.9'	116.0'	27.20	1394	CLEAR
9:56		START	AFTER 3	SURGES	HIGHER Q		VERY CLOUDY YELLOW
10:03	2.0cc 37.8 PPM						
10:16	1.6 PPM	1775	70.2'	128.3'	25.28	1500	CLEAR
10:23		START	AFTER 3	SURGES	VERY	CLOUDY	CLEAR 3 MINS.
10:38	.6cc 21 PPM						
10:43	.45 1.7 PPM	1810	71.3'	129.4'	25.38	1508	CLEAR
10:52		START	UP AFTER	3 SURGES			VERY CLOUDY CLEAR 4 MINS.
11:02	.6cc 31.8 PPM						
11:12	.9 15 PPM	1936	82.9'	141.0'	23.35	1629	CLEAR
11:19		START	AFTER 4	SURGES			SLIGHTLY YELLOWED
11:29	.9 47 PPM						
11:39	1.8cc .53 PPM	1960	88.6'	146.7'	22.12	1658	CLEAR
11:48		START	AFTER 3	SURGES			SLIGHTLY COLORED YELLOW
11:58	58.3 PPM	2150	99.3'	157.4'	21.65	1760	CLEAR
12:08	38. PPM	2140	103.6	161.7'	20.65	1760	CLEAR
12:28	3.2 3 PPM	2135	105.2'	163.3'	20.29	1760	CLEAR
12:48	1 PPM	2125	105.9'	164.0'	20.06	1755	CLEAR
12:57	START	AFTER	5 MIN	RELAX &	4X SURG	1326	LIGHT CLOUDY
1:07	.25cc 13.2 PPM	1450	58.2'	116.3'	24.91	1328	CLEAR
1:17	.35 5.3 PPM	1455	58.6	116.7'	24.82	1328	CLEAR

Layne Christensen Co. **Test Pump Data**

Customer BATTELLE Date 10-27-10 Job Number 1000-1968

Well Diameter 20" LINER Depth of Well 647' Static Water Level 58.1 Well # and Name #52

Pump Setting 235' Airline Depth 230' TOP OF SCREEN Flowmeter: Start _____ End _____

How Q Measured 8" MTR A.F. X .001 How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down___ Production___

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
1:28	START AFTER 4			SURGES		1200	CLEAR
1:48	.1 cc 2.6 PPM	1055	41.4'	99.0'	25.48	1143	CLEAR SAND FOR 5 MINS THAN >1
1:55	START AFTER 5			SURGES			CLEAR
2:15	.4 7.9 PPM	1423	56.5'	114.6'	25.18	1328	CLEAR SAND FOR 5 MINS THAN >1 VERY VERY SMALL AMT AIR
2:23	START AFTER 4			SURGES			CLEAR
2:28	.65 26.5 PPM	1850				1508	
2:33	.85 21.2 PPM	1820				1508	
2:38	1.0 15.9 PPM	1790	72.5'	130.6'	24.68	1508	CLEAR
2:43	1.1 10.6	1785	73.5	131.6			CLEAR
2:48	1.15 5.3 PPM	1785	73.9	132.0	24.15		CLEAR
2:54	START AFTER 4			SURGES			CLOUDY 3 MINS.
3:04	.8 42 PPM	2175	96.7	154.8'	22.49	1760	CLEAR
3:14	1.1 15.9 PPM	2125	99.0'	157.1	21.46	1760	CLEAR
3:25	START UP AFTER 7 SURGES						SLIGHT CLOUDY 2 MINS TO CLEAR
3:29	SHUT DOWN						
3:36	RESTART						SLIGHT CLOUDY 2 MINS TO CLEAR
3:56	.7 18.5	2125	102.2	160.3'	20.79	1762	CLEAR 104,150
							606,693 GAL. PUMPED TODAY

Layne Christensen Co. **Test Pump Data**

Customer BATTELLE J.P.L Date 10-28-10 Job Number 1000-1968

Well Diameter ~~20" LINNER~~ 16" LINNER Depth of Well – Static Water Level 58.6 Well # and Name #52

Pump Setting 235' Airline Depth 250' TOP OF SCREEN Flowmeter: Start 104.150 End

How Q Measured 8" MTR AC. FT. X .001 How W.L.s measured TRANSD. ELECT. Test Type: Development___ StepDraw-Down ✓ Production___

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS	
8:10			START	STEP #1			CLEAR	
8:15	.11 11.6 PPM	1480		109.4'		1322	CLEAR	104.174
8:20	.28 18 PPM	1460	52.9'	111.5'		1324	CLEAR	104.1946
8:25	.3 2.1 PPM	1450	54.2'	112.8'	26.75	1324	CLEAR	104.2169
8:40	.5 7.0 PPM	1440	55.2'	113.8'	26.08	1324	CLEAR	.2832
8:50	.6 3.53	1430	55.9'	114.5'	25.58	1326	CLEAR MINUT AMT AIR	.327'
9:10	.6 –	1422	57.4'	116.0'	24.77	1326	CLEAR DISC. 5 LBS.	.41438
9:40	.9 1.06 PPM	1422	58.1'	116.7'	24.47	1326	CLEAR " " ALMOST GAS FREE	.5454
10:10	.75 .88 PPM	1422	58.9'	117.5'	24.17	1326	CLEAR DISC. 5 LBS.	104.6763
						1429 AVG. FLO		
				STEP #2				
10:10						1411		
10:15	.09 9 PPM	1620	66.6'	125.2'	24.32	1410	CLEAR	.703°
10:20	.1 1 PPM	1610	67.1'	125.7'	23.99	1410	INC Q CLEAR DISC. 2 LBS	.7275
10:25	.11 1 PPM	1600	68.0'	126.6'	23.52	1418	INC Q CLEAR " "	.752°
10:40	.17 2.1 PPM	1618	69.0'	127.6'	23.44	1427	CLEAR DISC 2 LBS	.8265
10:55	.2 1.06 PPM	1618	69.5'	128.1'	23.28	1427	CLEAR VERY SMALL AMT AIR	.901
11:10	.28 2.8 PPM	1610	70.05'	128.65	22.98	1427	CLEAR SMALL AMT. AIR DISC. 1 LB.	104.9751
11:40	.3 .35 PPM	1610	70.5'	129.1	22.83	1427	CLEAR, SMAL AMT AIR, DISC. 1 LB.	105.1234
12:10	.4 1.7 PPM	1610	70.6'	129.2	22.80	1427	" " " , " "	105.2716
						1616 AVG. FLO		

Layne Christensen Co. **Test Pump Data**

Customer BATTELLE J.P.L. Date 10-28-10 Job Number 1000-1968

Well Diameter 16" LINNER Depth of Well _____ Static Water Level 58.6 Well # and Name #52

Pump Setting 235' Airline Depth _____ 16" LINER 250' SCREEN STARTS Flowmeter: Start _____ End _____

How Q Measured 8" MTR A.F. x .001 How W.L.s measured TRANSDUCER ELECT. Test Type: Development ___ StepDraw-Down ✓ Production ___

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS	
		STEP #3						
12:10								105.2716
12:15	.08 8.4 PPM	1860	78.2'	136.8'	23.78	1518	CLEAR	
12:20	.15 7.4 PPM	1765	78.7'	137.3'	22.42	1518	INC. Q "	105.3258
12:25	.19 4.2 PPM	1766	80.3'	138.9'	21.99	1538	INC. Q "	105.3529
12:40	.25 3.1 PPM	1803	82.2'	140.8'	21.93	1550	CLEAR DISC. 4.0 LBS.	105.4359
12:55	.37 4.2 PPM	1807	82.5'	141.1'	21.90	1550	CLEAR	105.5191
1:10	.5 4.5 PPM	1805	82.8'	141.4'	21.79	1547	CLEAR DISC. 4.0 LBS	105.6022
1:40	.7 3.56 PPM	1800	83.3'	141.9	21.60	1547	CLEAR DISC. 3 LBS	1:43 105.7845
2:10	.8 1.7 PPM	1800	83.5'	142.1	21.55	1547	CLEAR VERY SMALL AMT AIR D.P. 3 LBS.	105.9338
						1798	AVG. FLO	
		STEP #4						
2:10								
2:15	.9 10.6 PPM	2080	100.0'	158.6'	20.80	1734	CLEAR 9 LBS DISC.	105.9665
2:20	1.0 10.6 PPM	2100	101.4'	160.0'	20.71	1728	" 9 LBS DISC.	105.9988
2:25	2.0 cc 106 PPM	2098	101.4'	160.0'	20.69	1728	" 9 LBS DISC. ADJ Q ↓	6.031
2:40	2.2 7.0 PPM	2074	101.2'	159.8'	20.49	1718	" 8.5 LBS DISC. SMALL AMT AIR	106.1265
2:55	2.3 3.53 PPM	2070	102.0'	160.6'	20.33	1718	"	106.2218
3:10	2.4 3.54 PPM	2070	102.35'	160.95'	20.22	1718	CLEAR 8.5 LBS DISC. SMALL AMT AIR.	6.3189
3:40	2.5 1.76 PPM	2050	102.7'	161.3'	19.96	1718	" "	106.507
4:06	2.75 4 PPM	2050	103.3	161.9'	19.84	1718	CLEAR " "	106.6719
4:10	2.76 4 PPM	2050	103.3	161.9	1984	1718	CLEAR " "	106.698
				2074 G.P.M. AVG FLO			830,211 GALLON PUMPED	

Layne Christensen Company

Date: 11-1-10 Page _____

Customer: BATTELLE / JPL #52 Job No. 27- 1000-1968

Meter 8" X 326 Static level 57.64 Feet Hours/Page _____

Airline depth _____ Feet Total hours _____

16" CPS, 8" PUMP SET 235', SCREEN STARTS 250' G.P.D. _____

Operator: J. ALBA

PRODUCTION TEST

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments		FAU	TSS
								106.8048		
8:00			57.64		ELECTRIC MOTOR		METER READING	106804.8		
START 9.40										
9:45	▽	1972.3	138.05	80.45'		24.51	CLR (4 MIN READING)	829.0		
9:50	15 MIN READING	1884.28	147.57	89.97'		20.94	CLR	857.9		
9:55	7.42	1871.24	150.35	92.75'		20.17	CLR	886.6		
10:00	9.54	1877.76	152.05	94.45'		19.88	CLR	915.4		
10:10	9.54	1874.5	152.0	95.4'		19.64	CLR	16972.9		
10:20	5.3	1877.76	152.23	94.63'		19.84	CLR	17030.5		
10:30	5.3	1871.24	152.42	94.82'		19.73	CLR	87.9		
10:40	3.18	1877.76	153.35	95.75'		19.61	CLR	145.5		
10:55	1.41	1877.76	154.95	97.35'		19.28	CLR	231.9		
11:10	0.53	1871.24	154.77'	97.17'		19.25	CLR	318.0		
11:25	0.35	1877.76	156.34'	98.74'		19.01	CLR SMALL AMT AIR	404.4		
11:40	.5 PPM	1875	156.8'	99.2'		18.90	CLR 47 LBS DISC.	489.9		
12:20	.35 PPM	1870	157.8'	100.2'		18.66	CLR 47 LBS DISC.	107.7197		
						(1987 AVG FLO)				
12:50	.7 PPM	1868	158.2'	100.6'		18.56	CLR. 47 LBS DISC. SMALL AMT AIR			
1:20	.5 PPM	1863	158.6'	101.0'		18.49	CLR. 47 LBS DISC. SMALL AMT AIR	108.0629		
2:20	.5 PPM	1863	159.6'	102.0'		18.26	" " " " " "	108.4060		
3:20	.7 cc .5 PPM	1862	159.7'	102.1'		18.23	CLR. 47 LBS DISC. SMALL AMT. AIR	108.7489		
4:20	.8 cc. 2 PPM	1861	160.6	103.0'		18.06	CLR. 47 LBS DISC. SMALL AMT. AIR	109.0916		
5:30	1:1 .75 PPM	1861	160.2	102.6		18.13		109.4298		
		Change Shift								
6:30	1.76	1861	160.9	103.26		18.02	clr brn SND	1098216		
7:34	trc	1845	161.63	103.99		17.74	clr trc SND	110184		
8:30	trc	1857	161.29	103.65		17.91	clr trc SND	110503		
9:30	trc	1858	161.75	104.11		17.84	clr trc SND	110845		
10:30	clr	1858	162.0	104.36		17.80	clr NO SND	111187		
11:30	clr	1852	162.32	104.68		17.69	clr NO SND	111528		
12:30	clr	1858	162.0	104.36		17.80	clr NO SND	111870		
1:30	clr	1858	162.55	104.91		17.71	clr NO SND	112212		
2:30	clr	1852	162.78	105.14		17.61	clr NO SND	112553		

Layne Christensen Company

Date: 11-2-10 Page _____

Customer: Battelle/JPL #52

Job No. 27- 1000-1968

Meter 8" X 326

Static level 57.64 Feet

Airline depth _____ Feet

Hours/Page _____

Total hours _____

G.P.D. _____

Operator: _____

PRODUCTION TEST

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments	FAU	TSS
3:30	clr	1852	162.76	105.12		17.61	Clr NO SNd 112894		
4:30	clr	1855	162.75	105.11		17.64	Clr NO SNd 113235.5		
5:30	clr	1855	162.28	104.64		17.72	clr no SNd 113577		
6:30	.5 PPM	1855	162.5'	104.86		17.69	CLR. 47 LBS DISC. SMALL AMT AIR	113.9185	
7:30	.2 PPM	1855	162.5'	104.86		17.69	SAME SMALL AMT AIR	114.260	
8:30	.2 PPM	1852	162.75	105.11		17.61	CLR. 47 LBS DISC SMALL AMT AIR	114.6139	
9:06	.2 PPM	1851	162.75	105.11		17.61	SAME	114.8184	
9:40	.2 PPM	1851	162.8	105.16		17.60	SAME	115.0116	
							2,674,011.7 GAL PUMPED 24 HRS		
							AVG. FLO 1856.9 G.P.M.		
12:02	.2 PPM	1853	162.8'	105.16	1780	17.62		115.8193	
12:46	.1 PPM	1852	162.85	105.21		17.60		116.0691	
		SPINNER TEST & SAMPLING DONE							

Layne Christensen Company

Date: 11-3-10 Page _____

Customer: BATTELLE J.P.L. Job No. 27- 1000-1968

Meter 116,069 X _____ Static level 58.7 Feet Airline depth _____ Feet

Hours/Page _____ Total hours _____ G.P.D. _____

Operator: _____

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments	FAU	TSS
9:44		START					CLOUDY	116.069	
9:49	.4	1880	134.8				CLEAR		
9:54	.5	1880	136.7				"		
9:59	1.0	1886	138.5				48 LBS		
10:04	1.5	1885	139.0'					116.1852	
10:09	1.7	1890	139.5'					116.2148	
10:15	1.9	1885	141.7'	83.0	1780	22.76			
10:15	1.9 62.9 PPM	1885	141.7'	83.0	1780	22.76	47 LBS CLEAR NO AIR	116.2500	
10:30	2.0 3.5 PPM	1888	141.9'	83.2	1780	22.69	ADJ Q 50 LBS.	116.3388	
10:45	2.1 3.5 PPM	1860	139.4'	80.7'		22.92	50 LBS	116.4923'	
11:00	2.05 1.7 PPM	1860	139.5'	80.8'		23.01	50 LBS CLR. SMALL AMT AIR	116.5809	
11:15	2.20 1.7 PPM	1860	140.1'	81.4'	1780	22.85	49 LBS CLR. SMALL AMT. AIR	116.5942	
11:30	.9 PPM	1850	140.6'	81.9'		22.58	49 LBS DISC. SMALL AMT AIR	116.7072.5	
11:45	.9 PPM	1855	140.7'	82.0'		22.62	49 LBS " " "	116.7649	
							226,451 GALL. TOTAL		
							1871.4 G.P.M AVG.		
	SAMPLES TAKEN 10:45 AM TO 11:10 AM								

APPENDIX 2-11: Spinner Log Results for Well 52

PACIFIC SURVEYS

SPINNER
DOWN RUNS
PUMPING CONDITION

Job No.
15548

File No.

Company LAYNE CHRISTENSEN
Well #52
Field ALTADENA
County LOS ANGELES State CA

Location:

GPS:N34o11.770' W118o10.067'

Sec. Twp. Rge.

Other Services:

STOP COUNTS
SPINNER ANALYSIS
SAMPLING

Permanent Datum	G.L.		Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'		K.B.
Drilling Measured From	G.L.			D.F.
				G.L.

Date	11/2/2010		
Run Number	ONE		
Depth Driller	612'		
Depth Logger	612'		
Bottom Logged Interval	610'		
Top Log Interval	240'		
Pump Set @	235'		
Time Pumping Prior to Survey	1 HOUR		
Pumping Water Level	162'		
Max. Recorded Temp.	N/A		
Pump Rate (GPM)	1855		
Time Well Ready	6:30 AM		
Time Logger on Bottom	7:00 AM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	PORTER		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	250'	612'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	16"	N/A	0'	612'
Liner				

<< Fold Here >>>

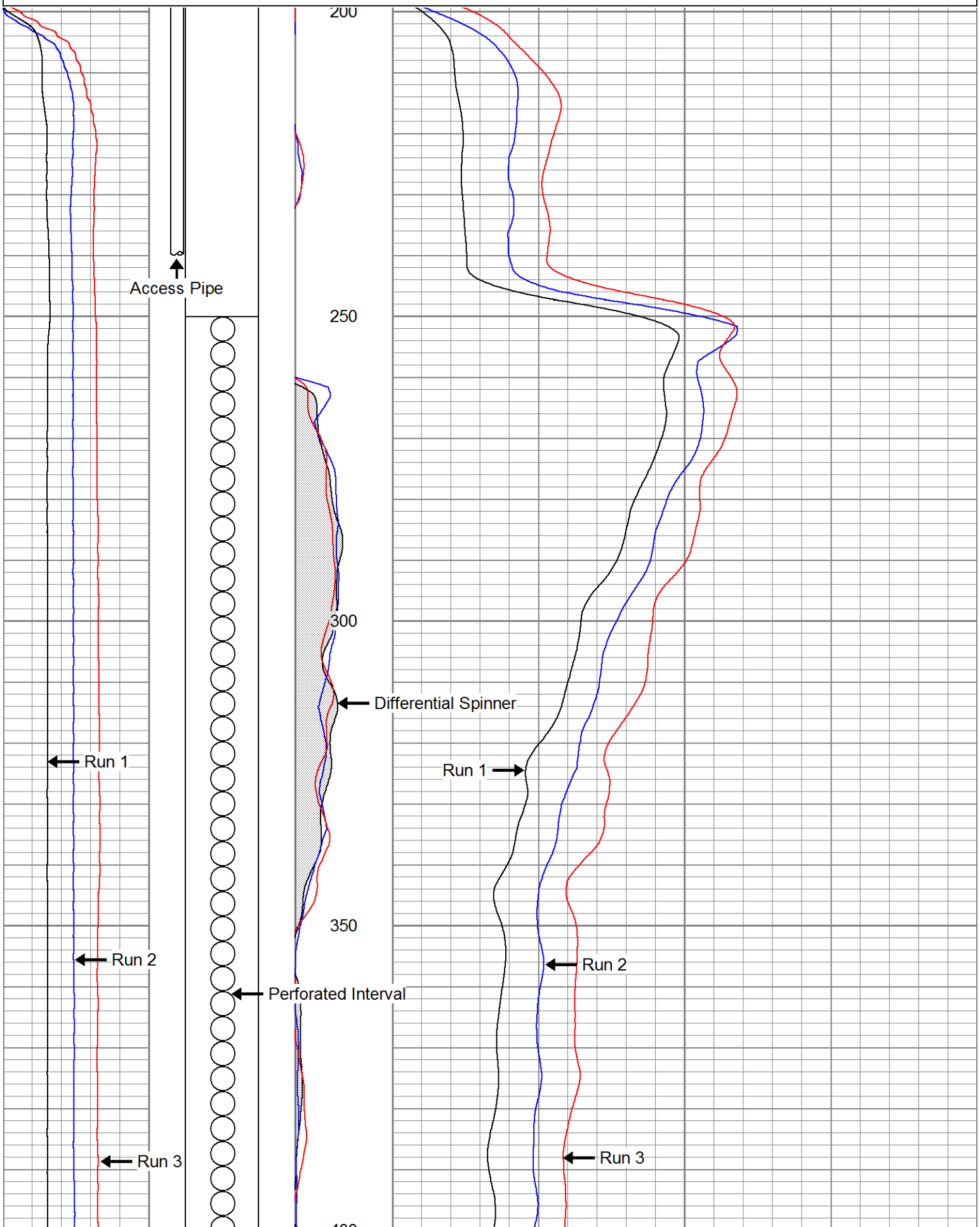
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

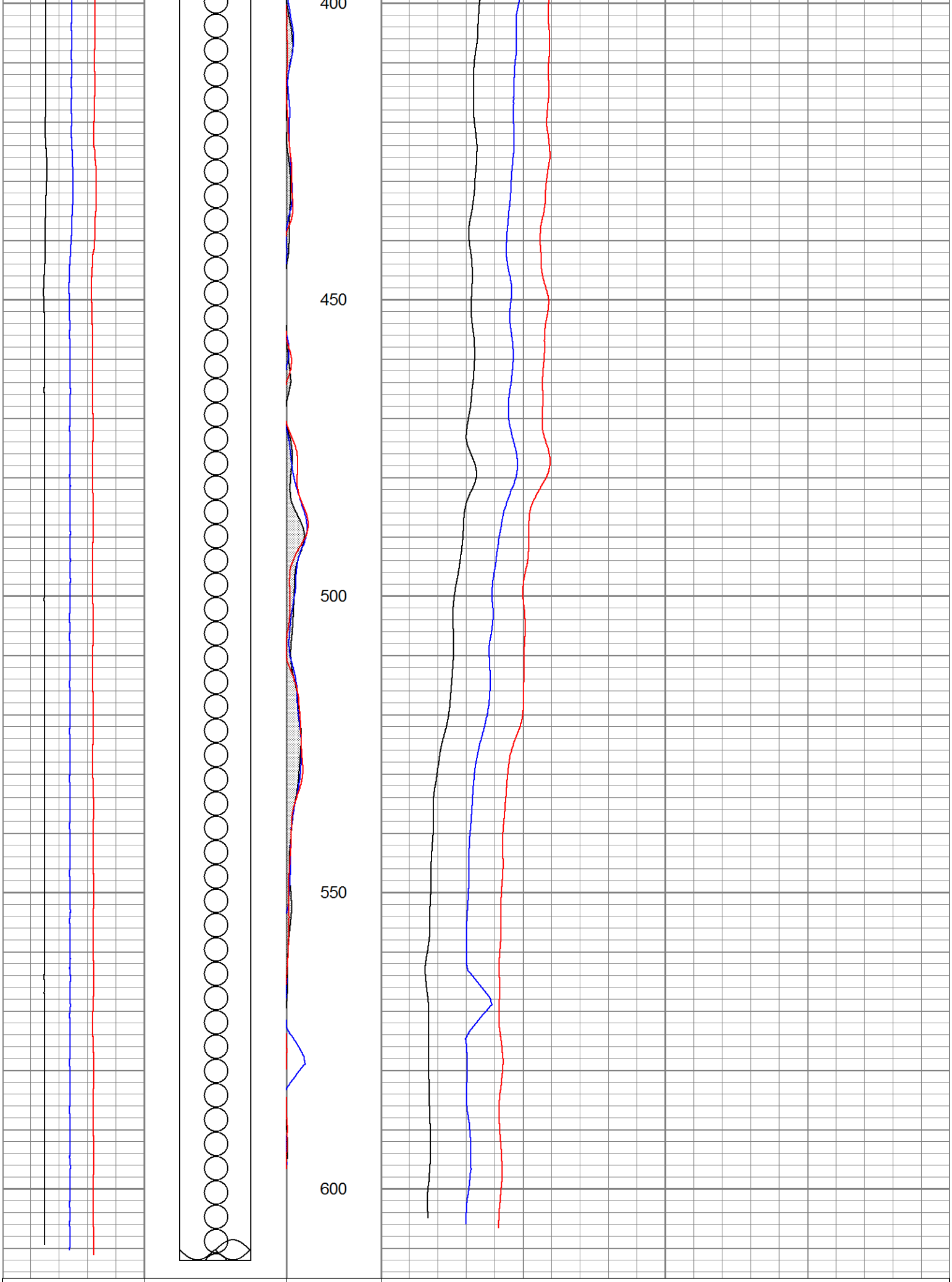
Comments

SAMPLES COLLECTED @ 310', 430', 510'

Database File: 15548.db
Dataset Pathname: spn
Presentation Format: spinmerg
Dataset Creation: Tue Nov 02 06:58:01 2010 by Log Open-Cased 090629
Charted by: Depth in Feet scaled 1:240

0	LS (ft/min)	200	CSG SCHDL	Delta Spin	0	Spinner Down Run (cps) 200
0	LS (ft/min)	200		Delta Spin	0	Spinner Down Run (cps) 200
0	LS (ft/min)	200		Delta Spin	0	Spinner Down Run (cps) 200




400
450
500
550
600
0
LS (ft/min)
200
CSG SCHDL
Delta Spin
0
Spinner Down Run (cps)
200

0	LS (ft/min)	200
0	LS (ft/min)	200

Delta Spin	0	Spinner Down Run (cps)	200
Delta Spin	0	Spinner Down Run (cps)	200

PACIFIC SURVEYS

SPINNER
STOP COUNTS
PUMPING CONDITION

Job No.
15548

File No.

Company LAYNE CHRISTENSEN
Well #52
Field ALTADENA
County LOS ANGELES State CA

Location:

GPS:N34o11.770' W118o10.067'

Sec. Twp. Rge.

Other Services:

DYNAMIC SPINNER
SPINNER ANALYSIS
SAMPLING

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'	K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	11/2/2010		
Run Number	ONE		
Depth Driller	612'		
Depth Logger	612'		
Bottom Logged Interval	610'		
Top Log Interval	240'		
Pump Set @	235'		
Time Pumping Prior to Survey	1 HOUR		
Pumping Water Level	162'		
Max. Recorded Temp.	N/A		
Pump Rate (GPM)	1855		
Time Well Ready	6:30 AM		
Time Logger on Bottom	7:00 AM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	PORTER		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	250'	612'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	16"	N/A	0'	612'
Liner				

<< Fold Here >>>

All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

Comments

SAMPLES COLLECTED @ 310', 430', 510'

Database File: 15548.db
Dataset Pathname: stop12
Presentation Format: spnstop
Dataset Creation: Tue Nov 02 09:15:17 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	550		0.00
60	550		0.00
			0.00
120	550		0.00
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

Database File: 15548.db
Dataset Pathname: stop11
Presentation Format: spnstop
Dataset Creation: Tue Nov 02 09:12:15 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

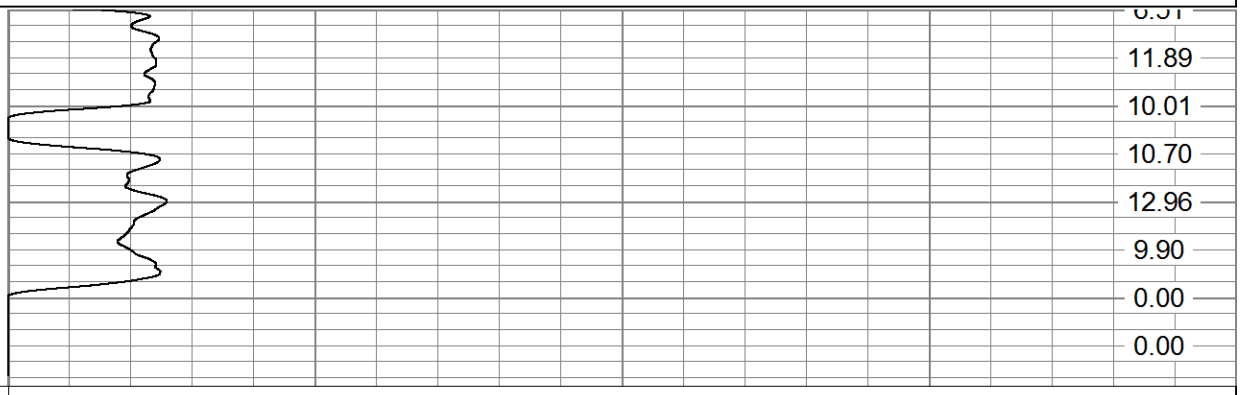
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	500		0.00
60	500		0.00
			0.00
120	500		0.00
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

Database File: 15548.db
Dataset Pathname: stop10
Presentation Format: spnstop
Dataset Creation: Tue Nov 02 09:08:52 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	450		10.97
60	450		10.41
			10.03
120	450		11.14
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

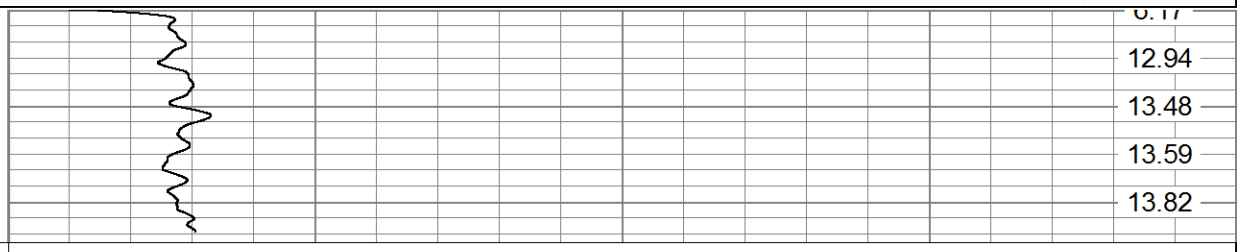
Database File: 15548.db
Dataset Pathname: stop9
Presentation Format: spnstop
Dataset Creation: Tue Nov 02 09:04:10 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	400		0.51
			11.89
60	400		10.01
			10.70
120	400		12.96
			9.90
180	400		0.00
			0.00
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)



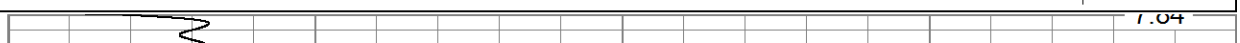
Database File: 15548.db
Dataset Pathname: stop8
Presentation Format: spnstop
Dataset Creation: Tue Nov 02 09:01:10 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

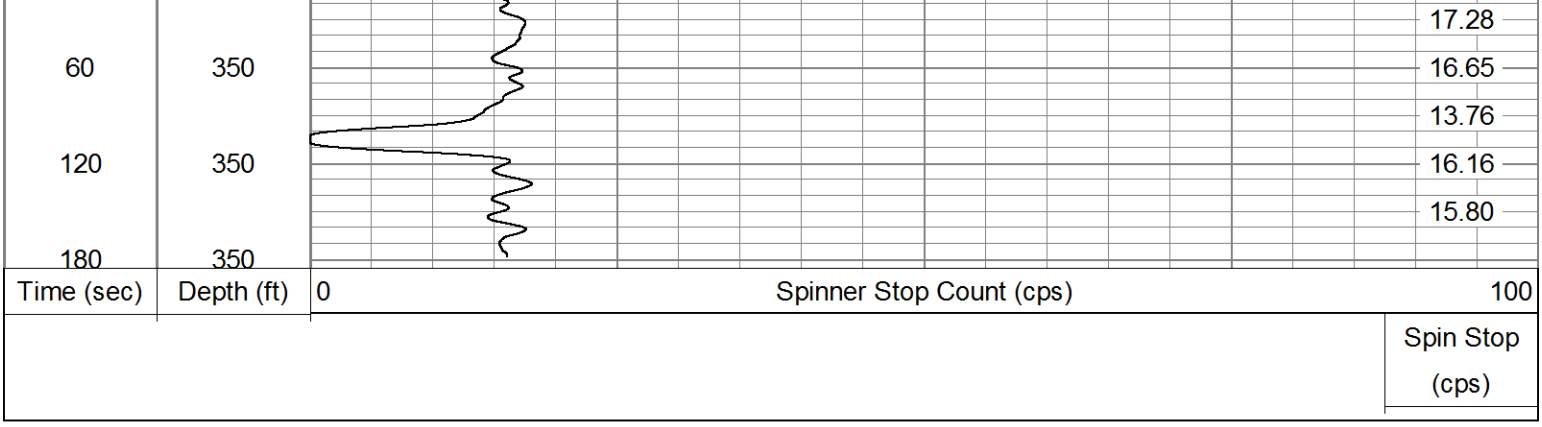
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	375		0.17
			12.94
60	375		13.48
			13.59
120	375		13.82
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)



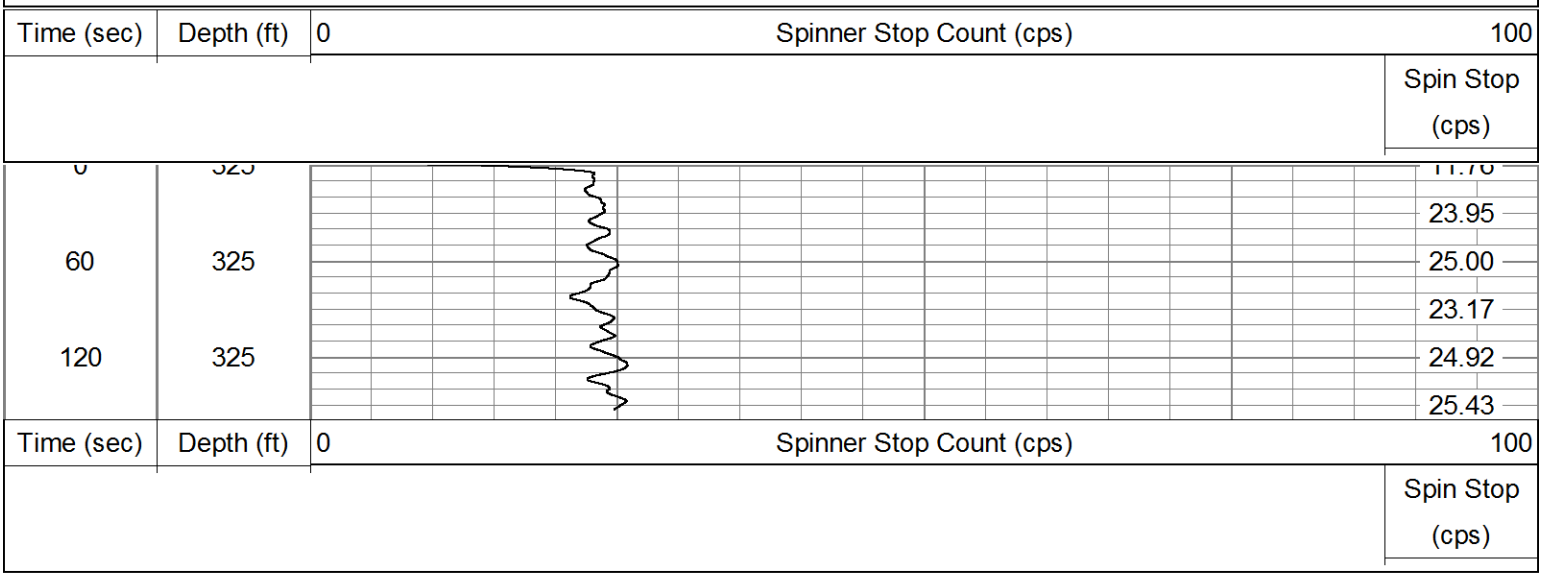
Database File: 15548.db
Dataset Pathname: stop7
Presentation Format: spnstop
Dataset Creation: Tue Nov 02 08:57:31 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	350		7.84

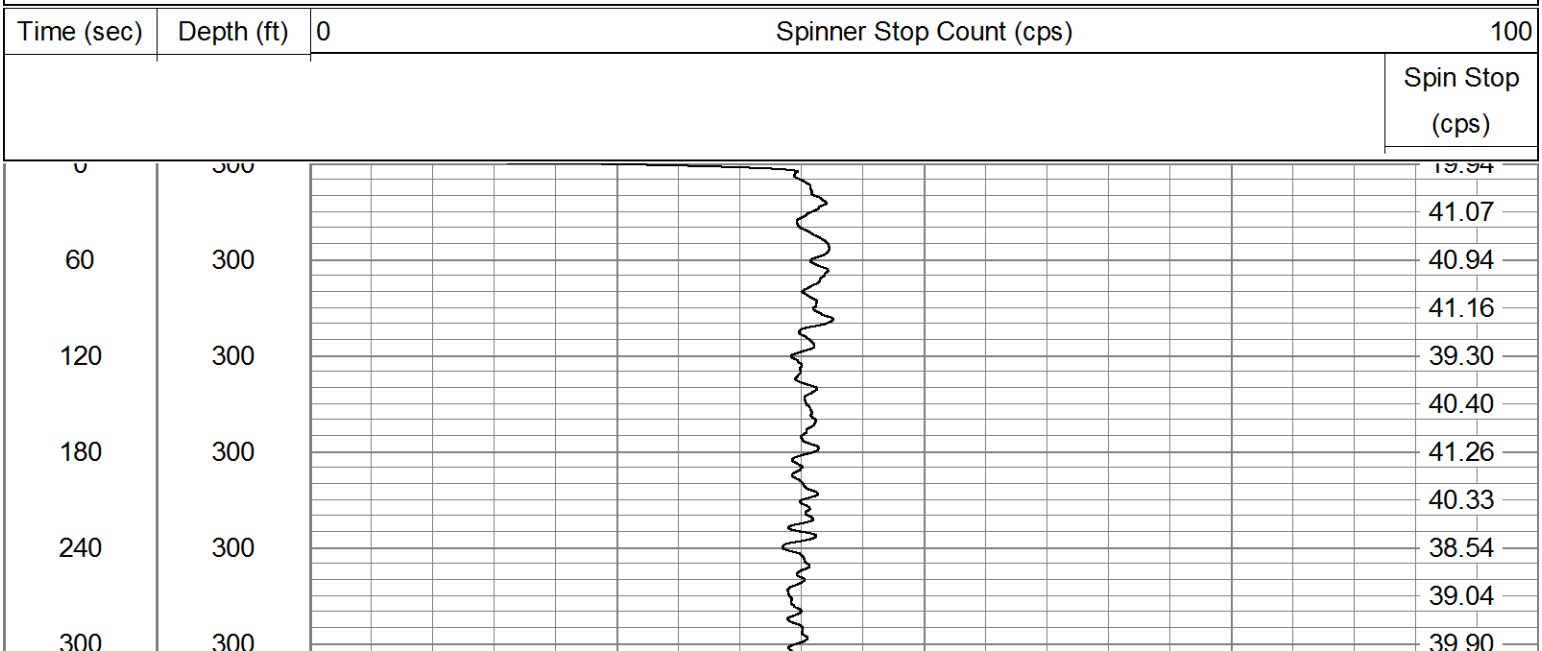


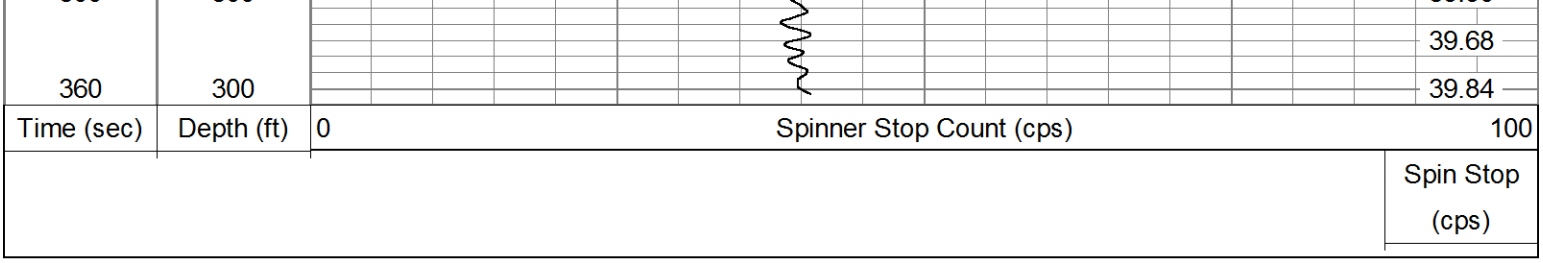


Database File: 15548.db
Dataset Pathname: stop6
Presentation Format: spnstop
Dataset Creation: Tue Nov 02 08:54:13 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

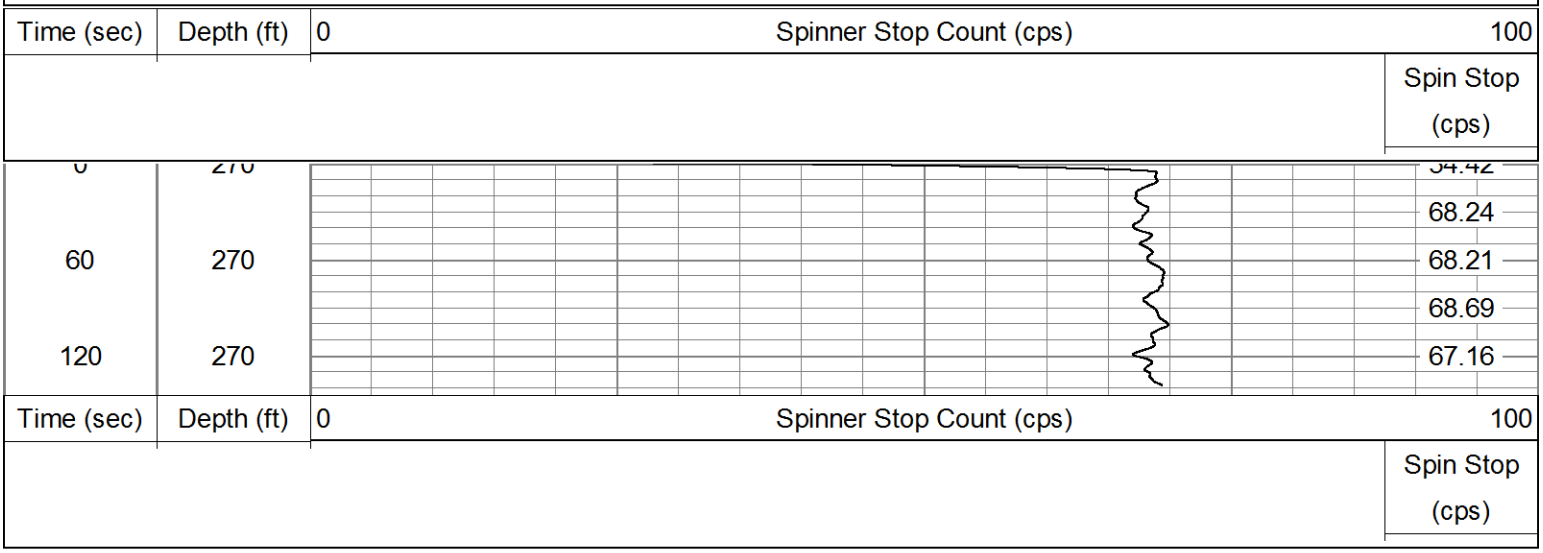


Database File: 15548.db
Dataset Pathname: stop5
Presentation Format: spnstop
Dataset Creation: Tue Nov 02 08:47:21 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

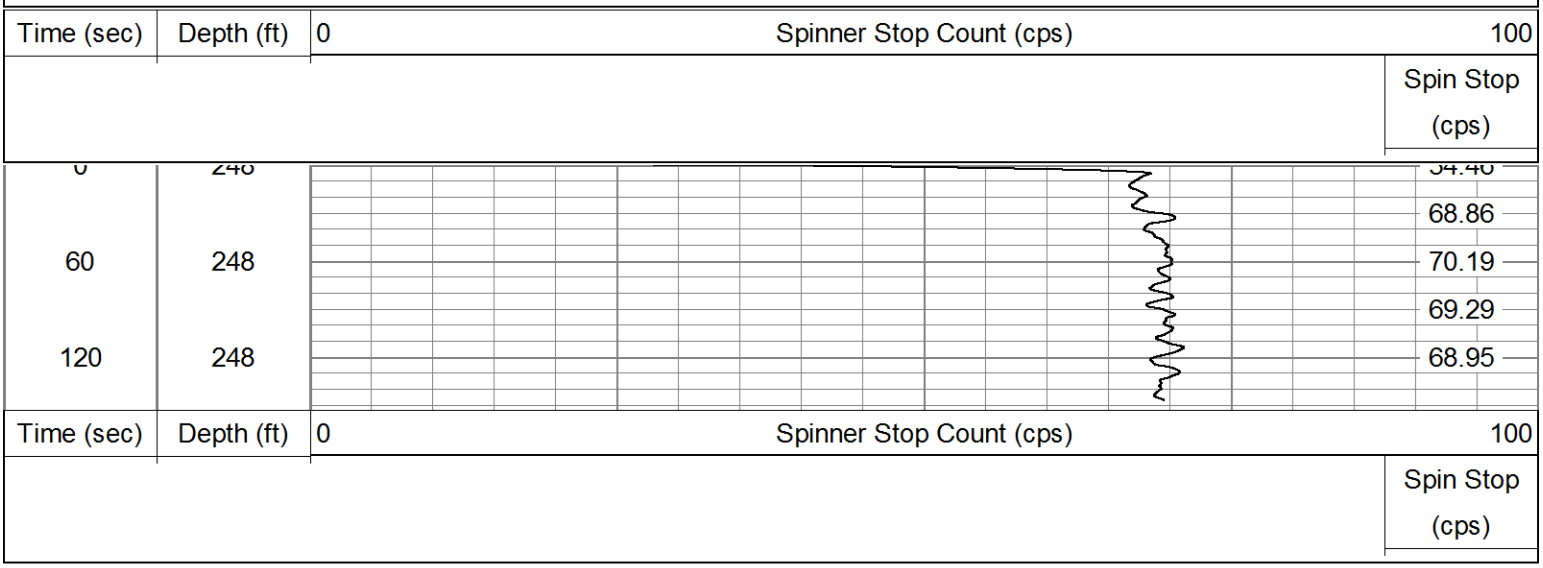




Database File: 15548.db
Dataset Pathname: stop4
Presentation Format: spnstop
Dataset Creation: Tue Nov 02 08:44:19 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour



Database File: 15548.db
Dataset Pathname: stop3
Presentation Format: spnstop
Dataset Creation: Tue Nov 02 08:41:13 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour



PACIFIC SURVEYS

SPINNER
FLUID VELOCITY
SPINNER ANALYSIS
PUMPING CONDITION

Job No.
15548

File No.

Company LAYNE CHRISTENSEN
Well #52
Field ALTADENA
County LOS ANGELES State CA

Location:

GPS:N34o11.770' W118o10.067'

Sec. Twp. Rge.

Other Services:

STOP COUNTS
DYNAMIC SPINNER
SAMPLING

Permanent Datum	G.L.		Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'		K.B.
Drilling Measured From	G.L.			D.F.
				G.L.

Date	11/2/2010		
Run Number	ONE		
Depth Driller	612'		
Depth Logger	612'		
Bottom Logged Interval	610'		
Top Log Interval	240'		
Pump Set @	235'		
Time Pumping Prior to Survey	1 HOUR		
Pumping Water Level	162'		
Max. Recorded Temp.	N/A		
Pump Rate (GPM)	1855		
Time Well Ready	6:30 AM		
Time Logger on Bottom	7:00 AM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	PORTER		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	250'	612'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	16"	N/A	0'	612'
Liner				

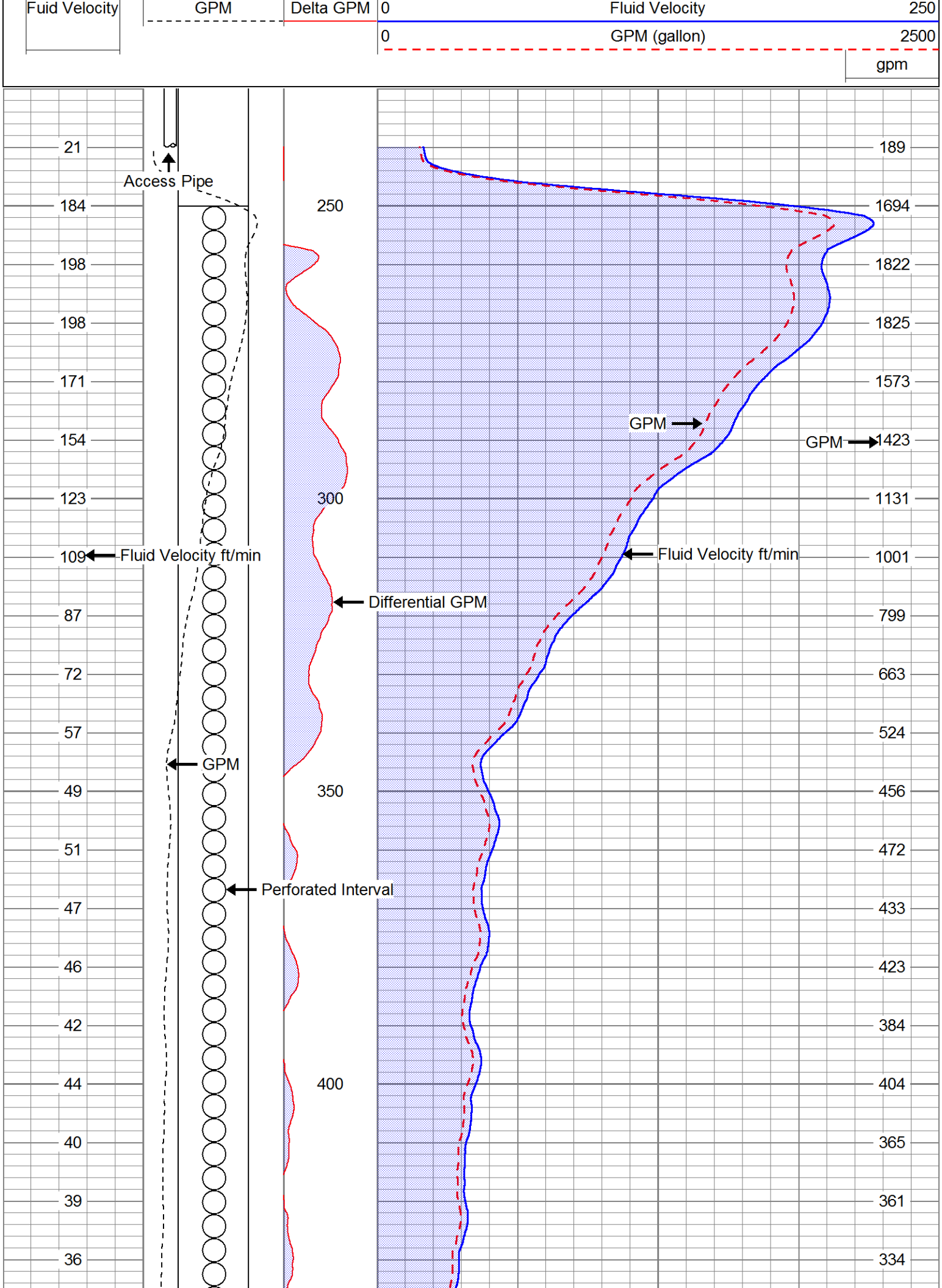
<< Fold Here >>>

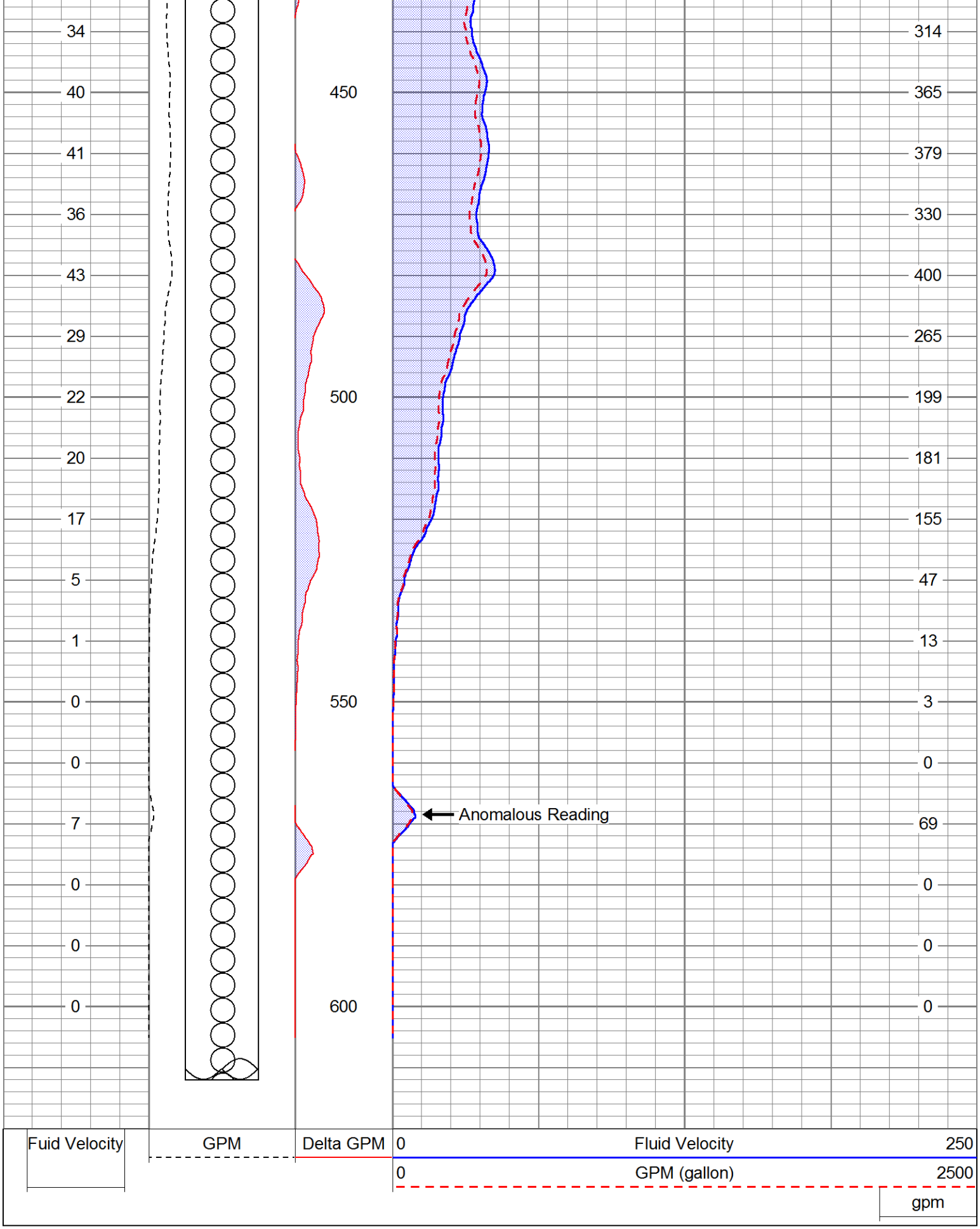
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

Comments

SAMPLES COLLECTED @ 310', 430', 510'

Database File: 15548.db
Dataset Pathname: @00db4bf0
Presentation Format: spinmerg
Dataset Creation: Wed Nov 10 14:53:35 2010
Charted by: Depth in Feet scaled 1:240


Fuid Velocity
GPM
Delta GPM
0
Fluid Velocity
250
0
GPM (gallon)
2500
gpm
21
184
198
198
171
154
123
109
87
72
57
49
51
47
46
42
44
40
39
36
Access Pipe
Fluid Velocity ft/min
GPM
Perforated Interval
250
300
350
400
Differential GPM
GPM
GPM
Fluid Velocity ft/min
189
1694
1822
1825
1573
1423
1131
1001
799
663
524
456
472
433
423
384
404
365
361
334

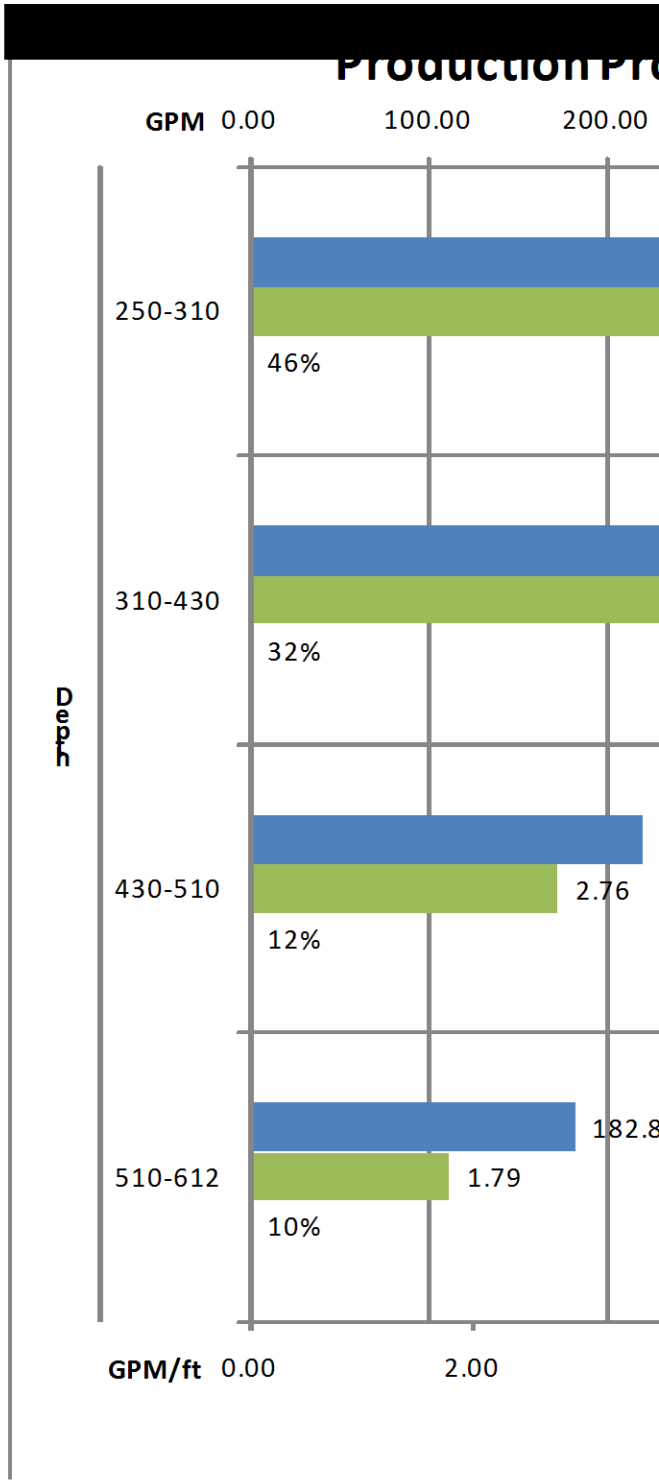

34
40
41
36
43
29
22
20
17
5
1
0
0
7
0
0
0
450
500
550
600
314
365
379
330
400
265
199
181
155
47
13
3
0
69
0
0
0
Anomalous Reading
Fuid Velocity
GPM
Delta GPM
0
Fluid Velocity
250
0
GPM (gallon)
2500
gpm

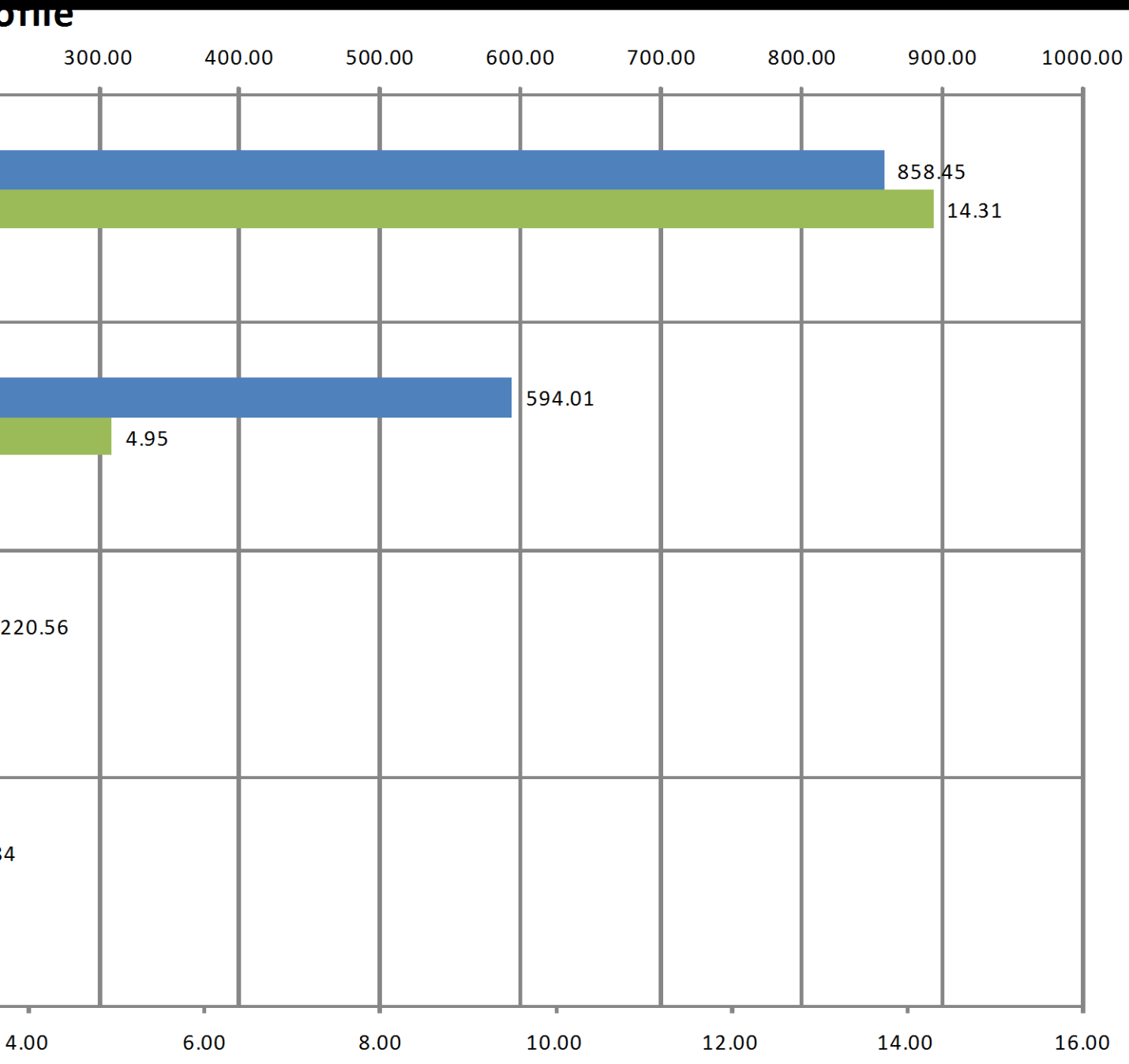
SPINNER LOG ANALYSIS

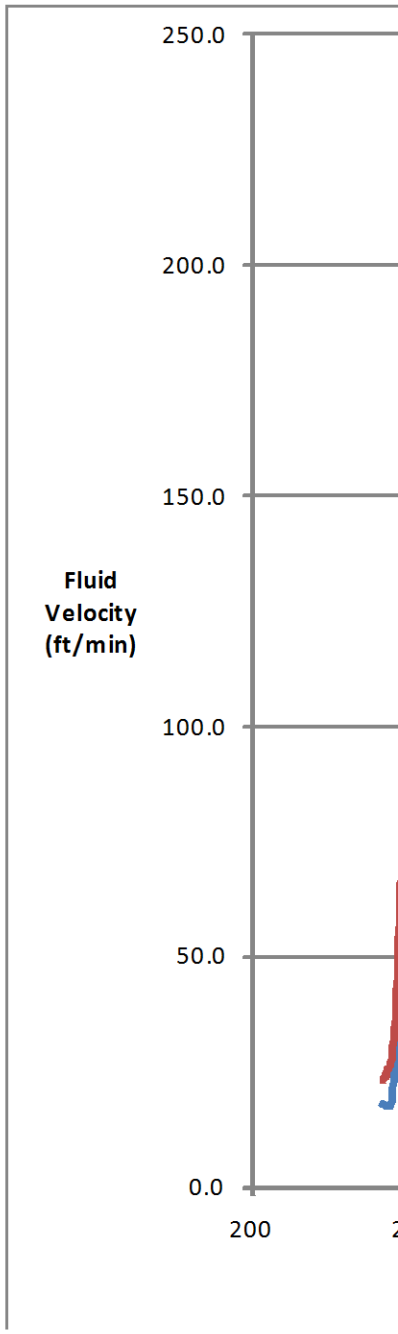
Pacific Surveys

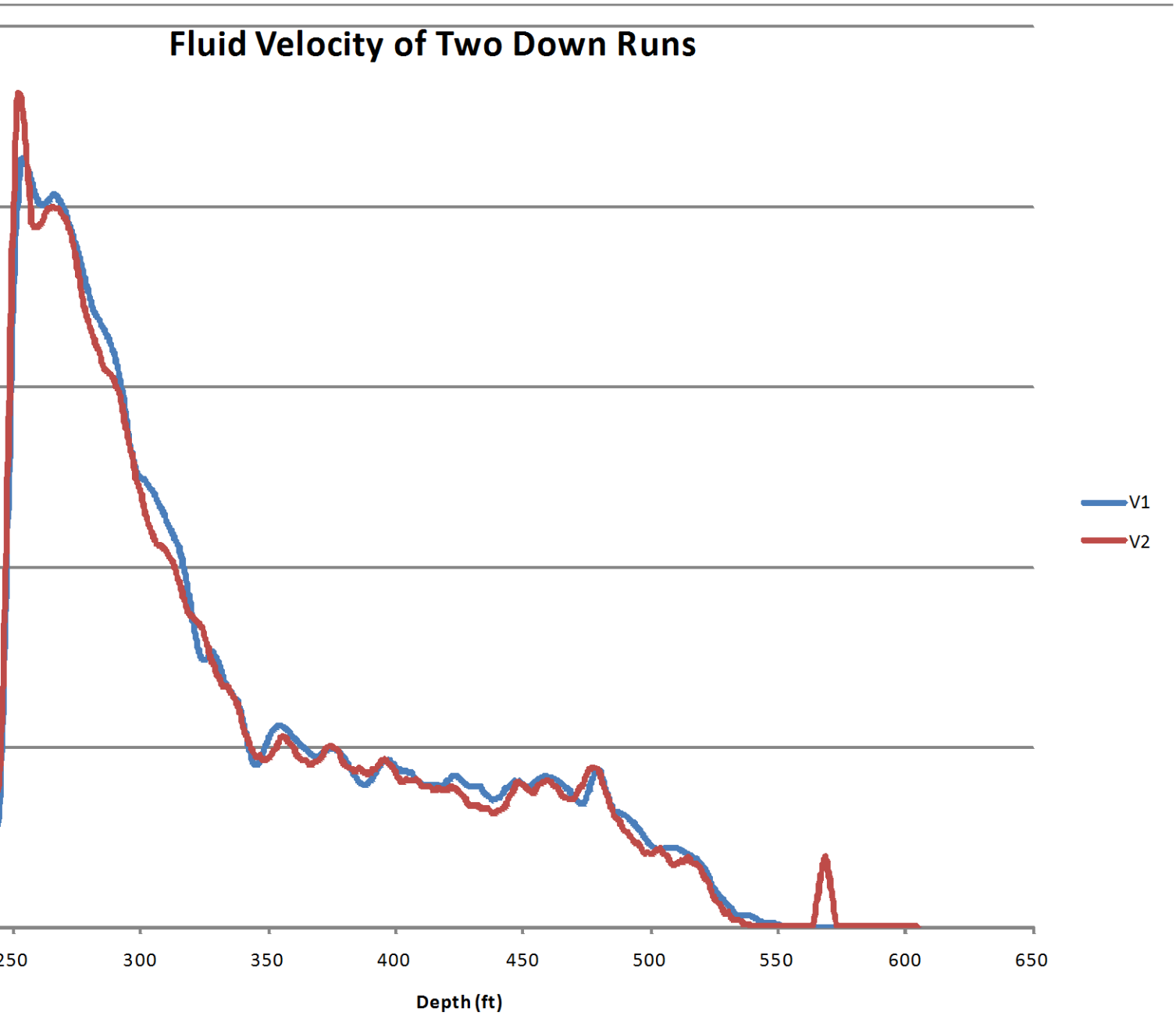
MAX
FLOW RATE 1855.86 GPM

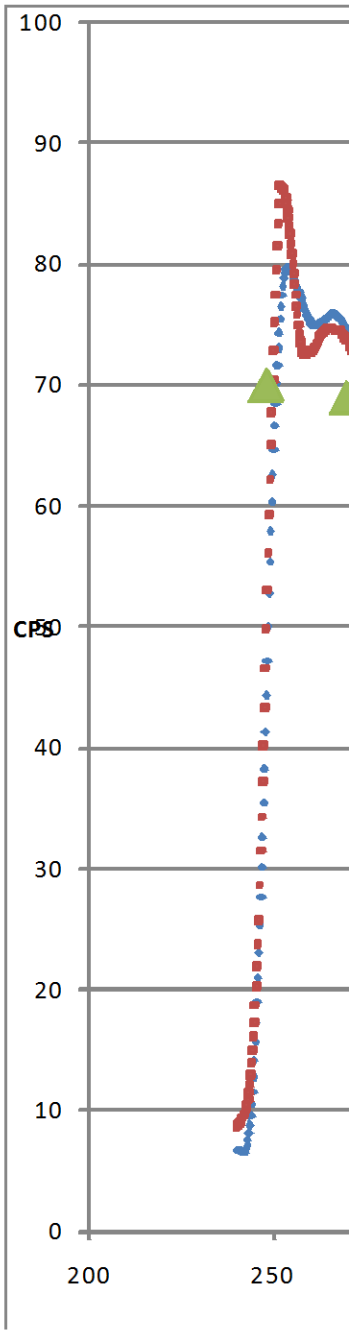
PERFS DEPTHS	PRODUCTION GPM	% OF FLOW ZONES	GPM/FT	THICKNESS ft
250-310	858.45	46%	14.31	60
310-430	594.01	32%	4.95	120
430-510	220.56	12%	2.76	80
510-612	182.84	10%	1.79	102

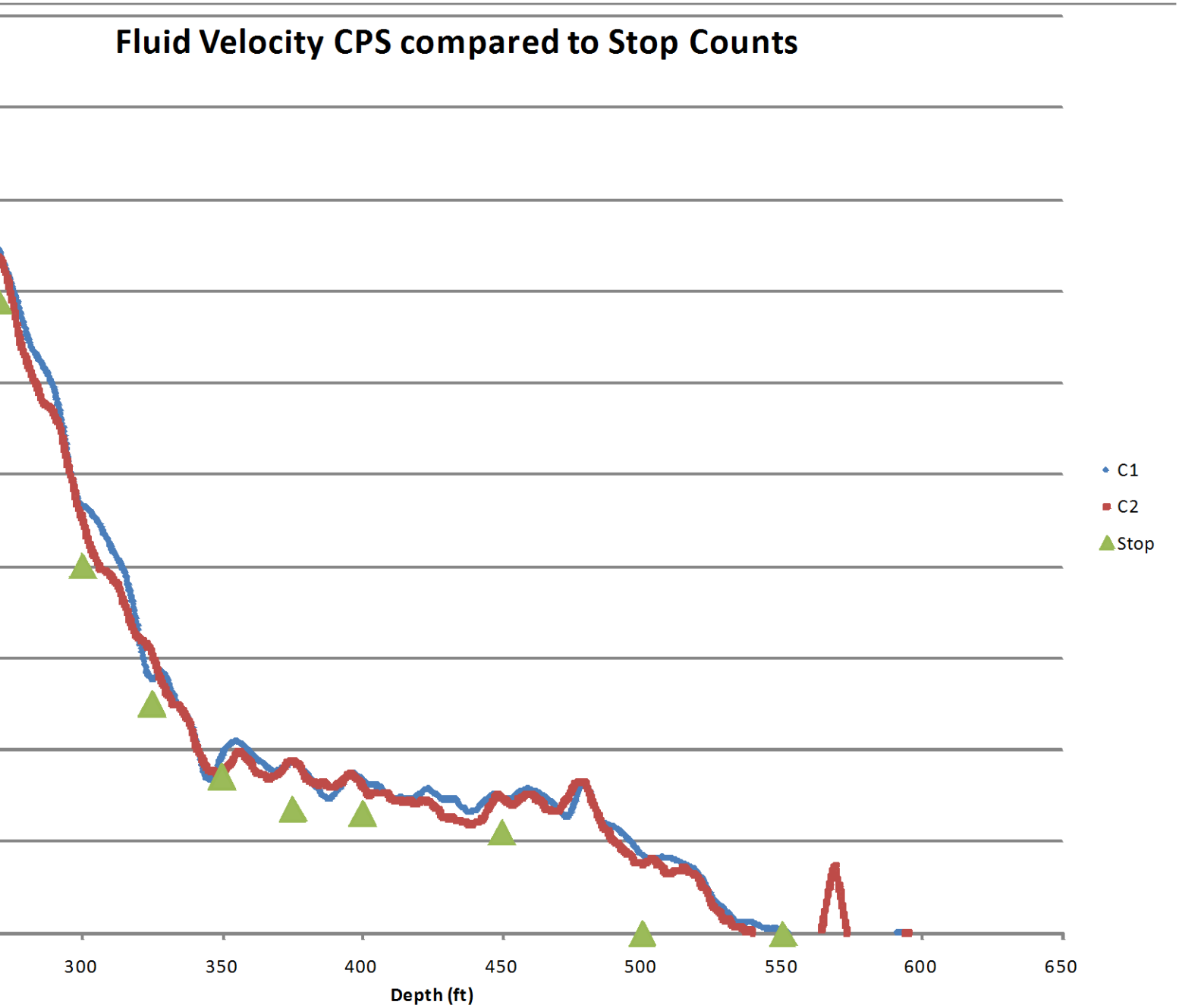


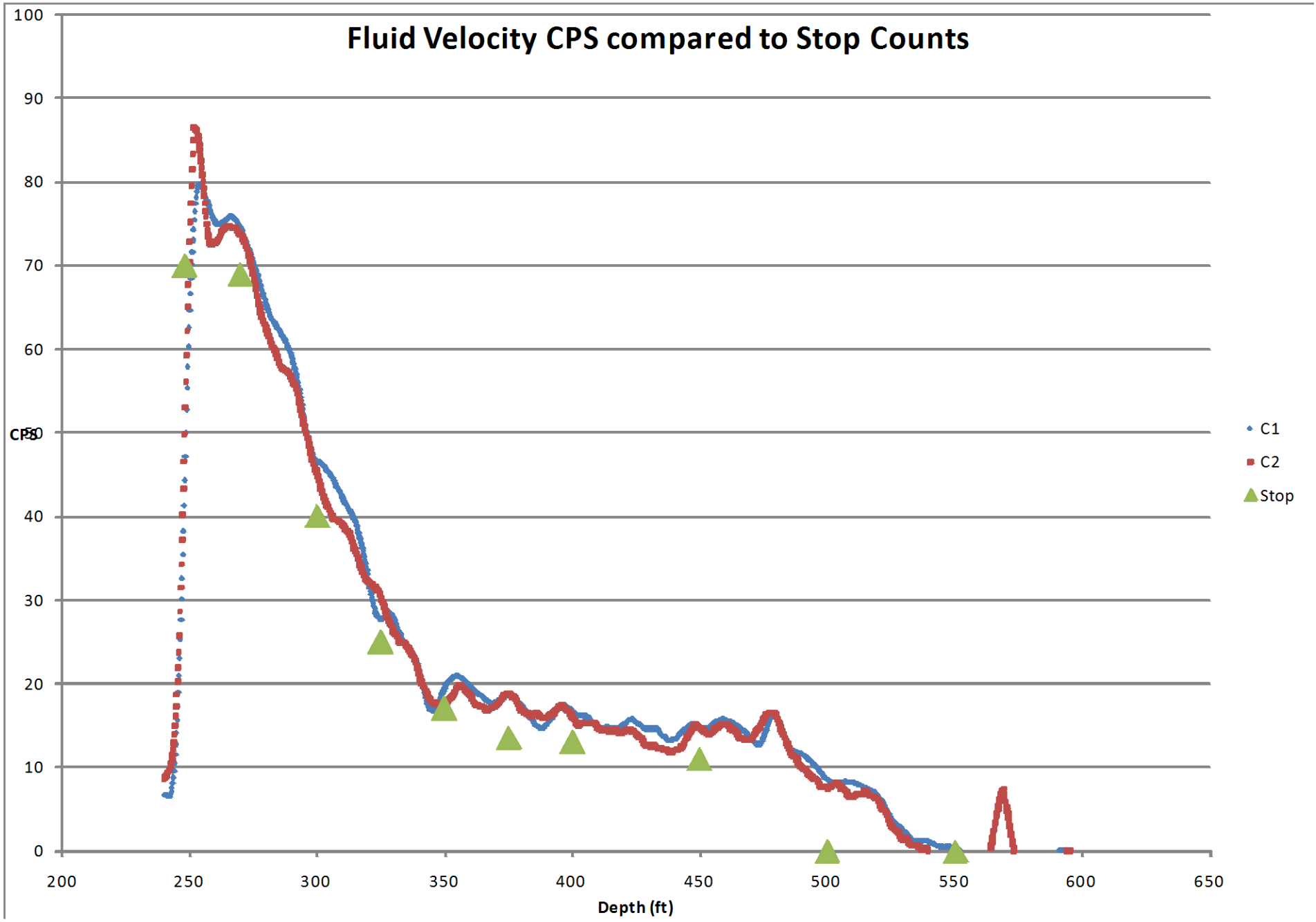

300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.00
858.45
14.31
594.01
4.95
220.56
4.00
6.00
8.00
10.00
12.00
14.00
16.00

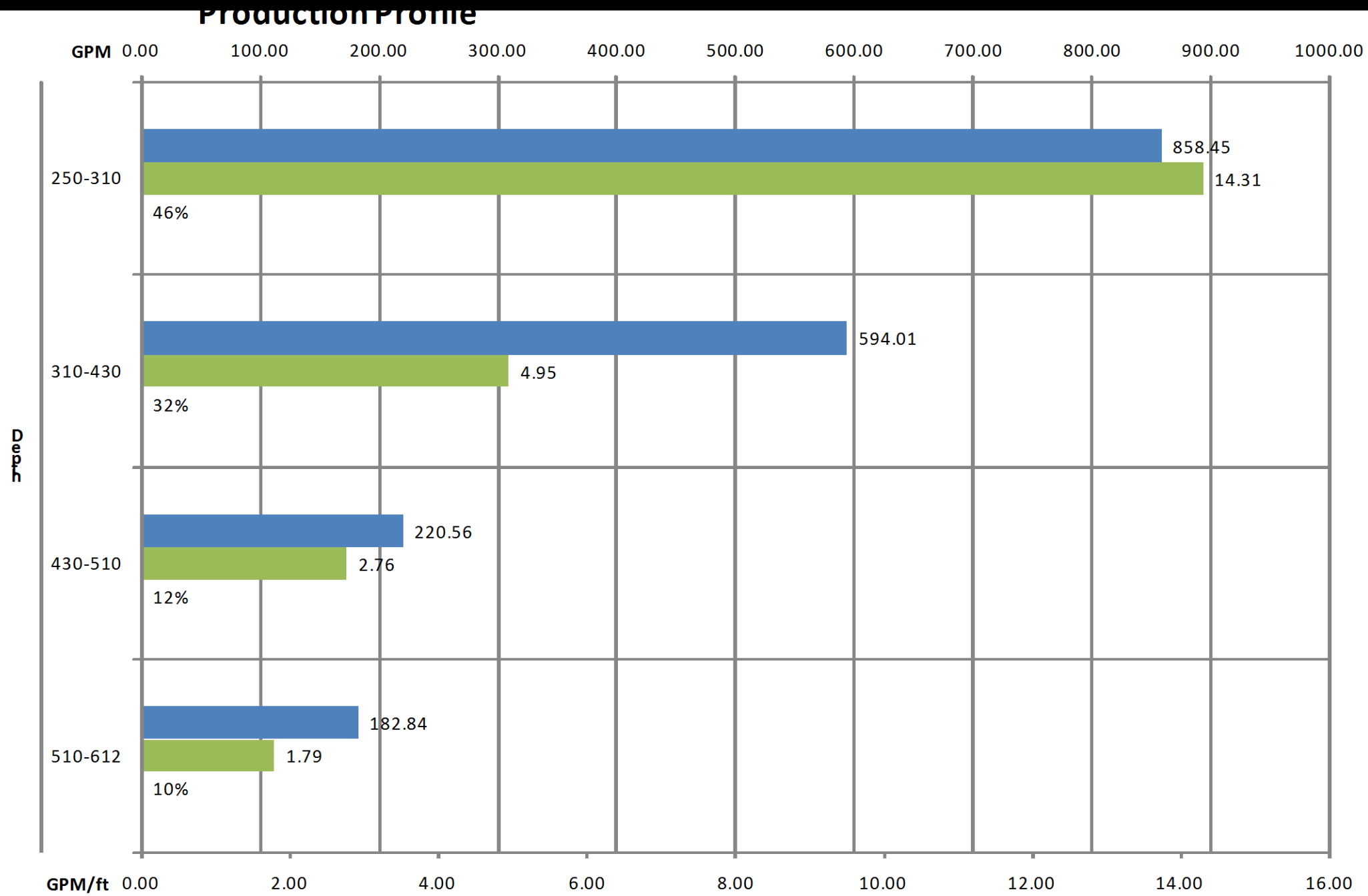

250.0
200.0
150.0
100.0
50.0
0.0
Fluid Velocity (ft/min)
200


Fluid Velocity of Two Down Runs
V1
V2
250
300
350
400
450
500
550
600
650
Depth (ft)


100
90
80
70
60
50
40
30
20
10
0
CPS
200
250


Fluid Velocity CPS compared to Stop Counts
C1
C2
Stop
300
350
400
450
500
550
600
650
Depth (ft)


Fluid Velocity CPS compared to Stop Counts
CPS
100
90
80
70
60
50
40
30
20
10
0
200
250
300
350
400
450
500
550
600
650
Depth (ft)
C1
C2
Stop


Production Profile
GPM
0.00
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.00
Depth
250-310
858.45
14.31
46%
310-430
594.01
4.95
32%
430-510
220.56
2.76
12%
510-612
182.84
1.79
10%
GPM/ft
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00

SPINNER LOG ANALYSIS

Pacific Surveys

MAX
FLOW RATE 1855.86 GPM

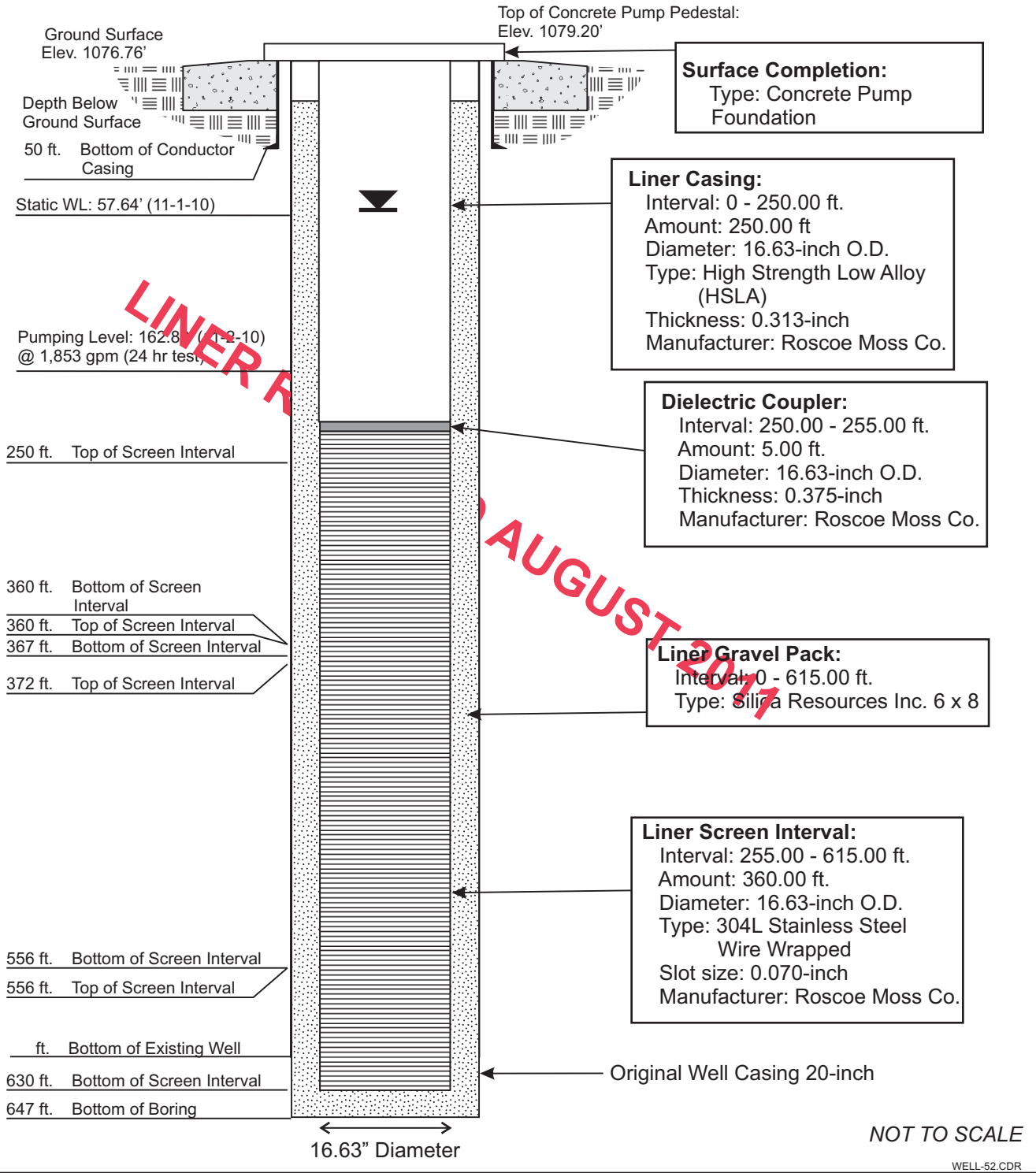
PERFS DEPTHS	PRODUCTION GPM	% OF FLOW ZONES	GPM/FT	THICKNESS ft
250-310	858.45	46%	14.31	60
310-430	594.01	32%	4.95	120
430-510	220.56	12%	2.76	80
510-612	182.84	10%	1.79	102

APPENDIX 2-12: Well 52 Pump Submittal and Liner Diagram

Battelle

Well Liner Diagram
Pasadena, California
WELL-52

State Well ID#: 1910124-021	Site: City of Pasadena (MHTS)	Well #: WELL-52	Northing: 1893789.615
Rehabilitation Contractor: Layne Christensen	Well/Liner Diameter: 20.00-inch/16.63-inch	Liner Install Date: 10/6/10 - 10/11/10	Easting: 6510947.930
Reviewed by: C. Shem Hawes	Installer/Welder: M. Evans/G. Frias	Geologist: D. Conner	Surface Elevation: 1076.76'



LINER R
AUGUST 2017

ESP Turbine Quotation System 8.0.1.44

Pump Performance Datasheet

Customer	: LAYNE CHRISTENSEN/FONTANA	Quote number	: 142671
Customer reference	Battelle -Well 52 Pump Curve and data	Item description	: 14RJMC
Item number		Stages	: 4
Service		Based on curve number	: 14RJMC-1770
Quantity	: 1	Date last saved	: 02 Nov 2010 1:18 PM

Operating Conditions

Flow, rated	: 1,800.0 USgpm
Differential head / pressure, rated (requested)	: 300.0 ft
Differential head / pressure, rated (actual)	: 300.8 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Performance

Speed, rated	: 1,770 rpm
Impeller diameter, rated	: 9.44 in
Impeller diameter, maximum	: 9.82 in
Impeller diameter, minimum	: 7.75 in
Efficiency (bowl / pump)	: 84.47 / 82.72 %
NPSH required / margin required	: 18.50 / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 58 / 156 Metric units
MCSF	: 1,000.0 USgpm
Head, maximum, rated diameter	: 447.5 ft
Head rise to shutoff	: 49.16 %
Flow, best eff. point (BEP)	: 1,878.3 USgpm
Flow ratio (rated / BEP)	: 95.83 %
Diameter ratio (rated / max)	: 96.10 %
Head ratio (rated dia / max dia)	: 90.12 %
Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 0.998 / 0.998 SG
Viscosity, rated	: 1.00 cP
-	:

Material

Material requested	: Auto
Material selected	: CI Bowl (Lined) / Std. Brz Impeller

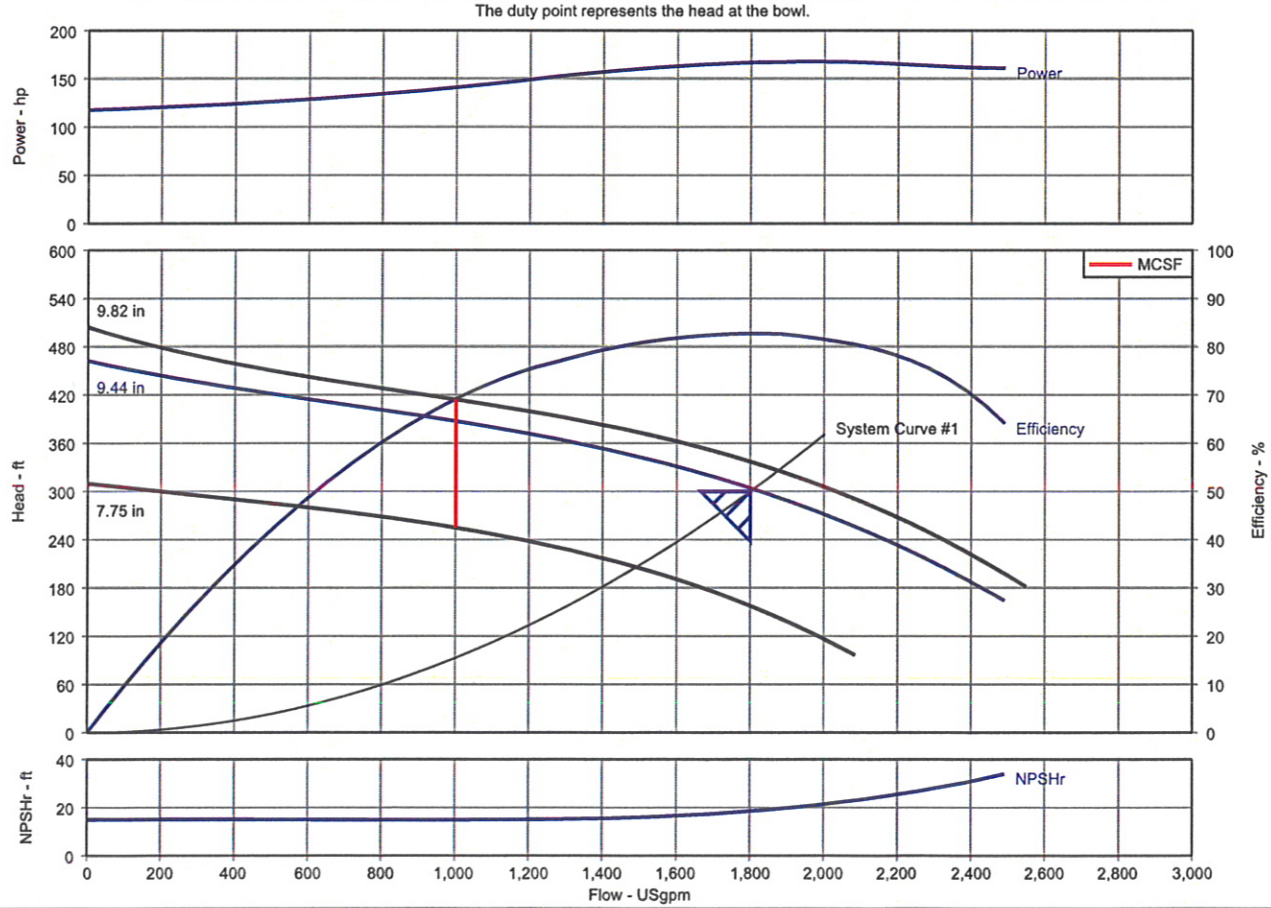
Pressure Data

Maximum working pressure	: 193.7 psi.g
Maximum allowable working pressure	: 420.0 psi.g
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 136 hp
Power (bowl / pump)	: 161 / 167 hp
Power, maximum, rated diameter	: 168 hp
Minimum recommended motor rating	: 200 hp / 149 kW

Pump performance. Adjusted for construction, viscosity, static lift to discharge nozzle centerline, friction and power losses of lineshaft and thrust bearings.
The duty point represents the head at the bowl.

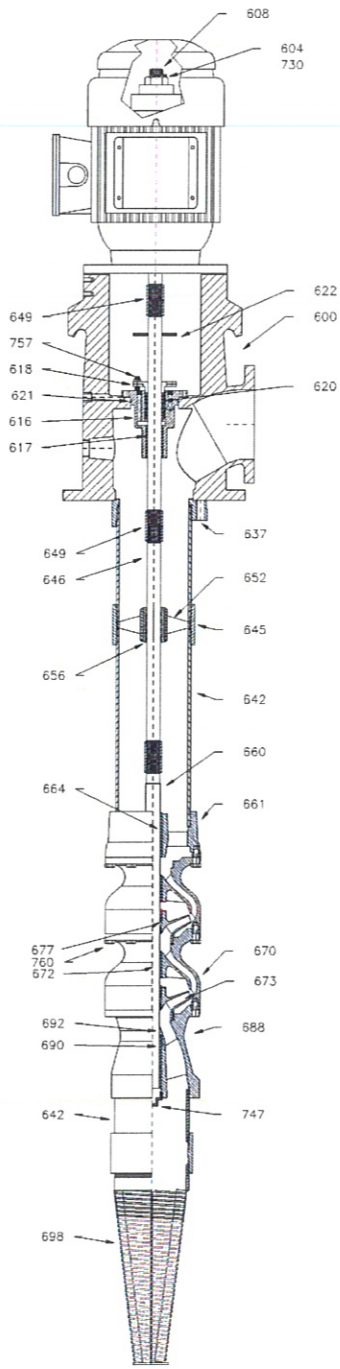


Layne Christensen/ Fontana · 11001 Etiwanda Ave · Fontana, CA 92337
phone: 909-390-2833 · fax: 909-390-6097

ESP Turbine Quotation System 8.0.1.44

Sectional Drawing

Customer	Battelle Well 52 - Materials of Construction	Quote number	: 142671
Customer reference		Item description	: 14RJMC
Item number		Stages	: 4
Service		Speed	: 1,770 rpm
Quantity of pumps	: 1	Date last saved	: 02 Nov 2010 1:24 PM



Discharge Head Assembly

ITEM	NAME	CODE	MATERIAL	ASTM
600	Head- Discharge	1003	Cast Iron CL30	A48-94ae1
604	Adjusting Nut	2130	Brass C36000	B16M-00
608	Headshaft	2227	SST 416	A582M-95b
616	Housing	1003	Cast Iron CL30	A48-94ae1
617	Housing bearing	1109	Federalloy Bismuth Bronze	B584-00
618	Split Gland	1203	SST 316	A744M-00
620	Packing	5026	Graphite Packing	ML402-99
621	O-Ring	5302	Nitrile Buna N	D4322-96
637	Top Column Flange	1003	Cast Iron CL30	A48-94ae1
639	Column Lock Ring	1018	Cast Iron CL30	A48-94ae1
649	Lineshaft Coupling	2265	416 SS	A582M-95b
757	Screw- Gland Adjusting	2229	SST 316	A276-00a
779	Gasket- Housing	5136	Acrylic/Nitrile	5136 REV 4

Column And Lineshaft Assembly

ITEM	NAME	CODE	MATERIAL	ASTM
642	Column Pipe	6501	Black Pipe	A 53-98
645	COLUMN FASTENER		Ductile iron	
646	Lineshaft	2227	416 SS	A582M-95b
649	Lineshaft Coupling	2265	416 SS	A582M-95b
652	Retainer- Bearing		Ductile iron	-00
656	Lineshaft Bearing	5121	Rubber EPDM	D3568-98

Bowl Assembly

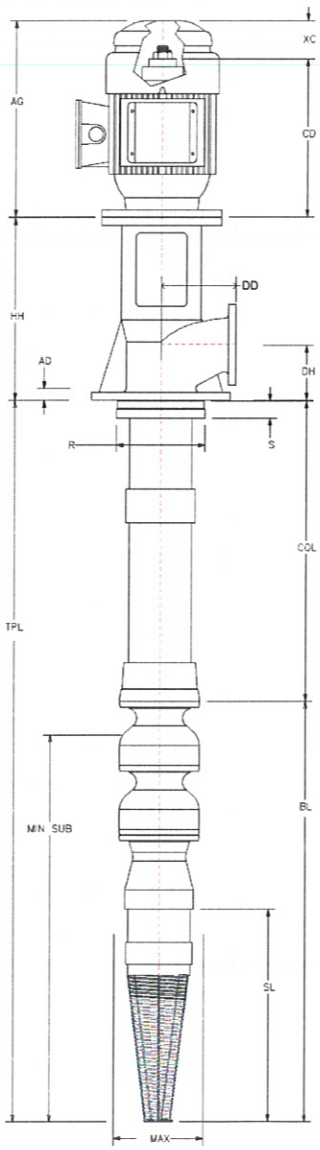
ITEM	NAME	CODE	MATERIAL	ASTM
660	Bowl Shaft	2227	416 SS	A582M-95b
661	Bowl- Discharge	1003	Cast Iron CL30	A48-94ae1
664	Bearing- Disc Bowl	1109	Federalloy Bismuth Bronze	B584-00
670	Bowl - Intermediate	6911	Cast Iron 30 Lined	A48-94e1
672	Bearing- Int. Bowl	1109	Federalloy Bismuth Bronze	B584-00
673	IMPELLER	1102	Silicon Bronze	B584-00
677	Collet	2227	SST 416	A582M-95b
688	Bowl/Bell- Suction	1003	Cast Iron CL30	A48-94ae1
690	Bearing- Suction	1109	Federalloy Bismuth Bronze	B584-00
692	Sandcollar	1205	304 SST	A744M-00
698	Strainer- Suction	6913	SST 316 Xpnd Metal	A555-97
747	Suction Plug	1046	Malleable Iron	A197
760	CAP SCREW	2229	316 ss	A194

Layne Christensen/ Fontana · 11001 Etiwanda Ave · Fontana, CA 92337
phone: 909-390-2833 · fax: 909-390-6097 ·

ESP Turbine Quotation System 8.0.1.44

Dimensional Outline

Customer	Batelle Well 52 - Dimensional Outline	Quote number	: 142671
Customer reference		Item description	: 14RJMC
Item number		Stages	: 4
Service		Speed	: 1,770 rpm
Quantity of pumps	: 1	Date last saved	: 02 Nov 2010 1:24 PM

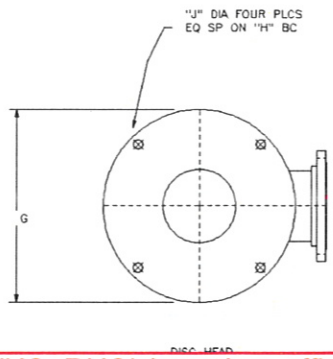


Pump Data

AD	: 1.37 in	Bowl Shaft	: 1.94 in
AG	: 50.06 in		
BD	: 16.50 in	Line Shaft	: 1.69 in
BL	: 180 in	Line Shaft Type	: Open
CD	: 44.78 in	Column Type	: Standard
CL	:	Column	: 10 in. Threaded
COL	: 342.5 ft	Bearing Spacing	: 10.00 ft
	:	Section Length	: 10.00 ft
DD	: 14.69 in	Head Type	: F Cast
MIN SUB	: 177 in	Head Size	: 10 X 16 1/2 CF
MS	:	Flange Rating	: 250#
DH	: 10.56 in		
G	: 25.00 in	Seal	: Packing
H	: 22.75 in	Strainer	: Cone
HH	: 28.25 in	SubBase	: No
J	: 0.75 in		
R	: 14.60 in		
S	: 2.38 in		
SL	: 150 in		
TPL	: 357.4 ft		
UG	:		
V	:		
W	:		
X	:		
XC	: 0.00 in		
Y	:		
Z	:		
	:		
Max Allowable Shaft Elongation	:		
Total Shaft Elongation	: 0.19 in		
MAX	: 13.62 in		

Hydraulic Data

Flow	: 1,800.0 USgpm
TDH (total dynamic head)	: 304.1 ft
	:
Speed	: 1,770 rpm
Fluid	: Fresh Water
Temperature	: 68.00 deg F
Viscosity	: 1.00 cP
Density	: 0.998 SG
SU	: 0.00 in
	:
	:
M (TPI)	: 0
L	: 1.69 in



US Motors, VHS, RUSI (premium efficient), Non reverse ratchet, WP1 enclosure, 120 vac space heaters

Miscellanious

Thrust at Design	: 5,734.4 lbf
Max Thrust	: 7,206.8 lbf
	:

Weight

Pump	: 19,920.0 lb
Motor	: 1,600.0 lb
Total	: 21,520.0 lb

Motor Data

Model	: HO200V2SLH
Make	: -
HP	: 200
"Nominal" RPM	: 1800
ITT Item No.	: N/A
"Nominal" Efficiency	: 96.2
Frame	: H445TPA
Ratchet	: NRR

Layne Christensen/ Fontana · 11001 Etiwanda Ave · Fontana, CA 92337
phone: 909-390-2833 · fax: 909-390-6097 ·

PASADENA WATER DIVISION
WELL VENTURA NO. 21

Depth to Sand

Date	Depth
11/65	426
11/66	429
3/71	419
7/71	424
12/71	473

Floor Level

473'

PERFORATIONS

FROM	TO
102	141
164	218
241	311
410	468

REMARKS

(1) Casing looks bigger than double 8

WELL

DRILLED BY Roscoe Moss Co.

CONTRACT NO. 1034

DATE 4/25/1924

WORK ORDER 1390

CASING 26 IN NO. 8 (1) GUAGE

STARTER | LENGTH 30' | PLY Double 1/4" | GUAGE

SHOE 26" x 12" x 1 1/2"

ALTERATIONS

PASADENA WATER DEPARTMENT

WELL Ventura NO.

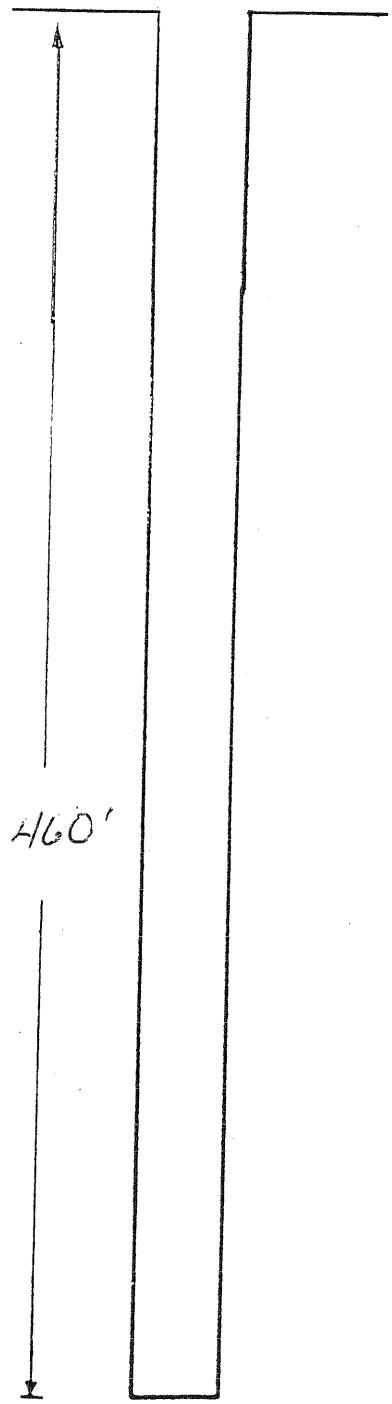
PERFORATIONS

FROM	TO
220	459

.060 SLOT WW Screen
4/1988 GPC

REMARKS

Johnson Well Screen
316SS .060 SLOT



PASADENA WATER DIVISION
WELL VENTURA NO. 21

Depth to Sand

Date	Depth
11/65	426
11/66	429
3/71	419
7/71	424
12/71	473

INSTALLED 1988

Floor Level

220' BLANK LINER

220' of 20" BLANK LINER
20" LINER

473'

240' of JOHNSON SS SCREEN LINER

PERFORATIONS

FROM	TO
102	141
164	218
241	311
410	468

REMARKS
(1) Casing looks bigger than double 8

WELL

DRILLED BY Roscoe Moss Co.

CONTRACT NO. 1034

DATE 4/25/1924

WORK ORDER 1390

CASING 26 IN NO. 8 (1) GUAGE

STARTER | LENGTH 30' | PLY Double 1/4" | GUAGE

SHOE 26" x 18" x 1 1/2"

ALTERATIONS

12/71

APPENDIX 2-14: Original Ventra Well Completion and Boring Log

ROSCOE MOSS COMPANY

959 EAST 4TH STREET
LOS ANGELES, CAL.

WELL CONTRACTORS — RENTAL TOOLS

Log of Well No. Ventura St., Drilled for City of Pasadena,
of Pasadena, California.

Started work June 7, 1924.

Completed work Aug. 6, 1924.

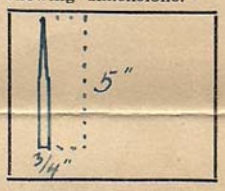
Total depth 489'

473 ft. of 26 inch #8 XXX gauge casing used 473' left in Well

Type of Perforator used Mills

Perforated	102 ft. to	141 ft.	12	Holes per	12 inches
"	164 "	218 "	12	" "	12 "
"	242 "	244 "	12	" "	12 "
"	260 "	312 "	12	" "	12 "
"	410 "	468 "	12	" "	12 "
"	"	"	"	"	"
"	"	"	Total 2513 holes perforated		
"	"	"	"	"	"
"	"	"	"	"	"

Make diagram of perforation in square, showing dimensions.



Diameter of Perforations 3/4" inches

Length of Perforations 5" to 5-1/2" inches

Depth at which water was first found 103.9 ft.

Standing level before perforating 102.9 ft.

Standing level after perforating ft.

Note below your observation of any change in water level while drilling

Water level when first started Test ft.

Draw down from standing level ft.

No. of gallons per minute pumped when Test first started

No. of gallons per minute pumped when Test completed

Draw down at completion of Test ft.

Formation: Mention size of water gravel—

0- 90 ft. to	Pit ft.	270-293	Clay, sand & gravel
90-127	Sand & coarse gravel	293-311	Sand & gravel
		311-351	Clay
127-140	Sand, Gravel and clay, mixed.	351-353	Clay, sand & gravel
		353-385	Hard clay
140-157	Clay	385-409	Clay, sand & gravel
157-163	Clay, sand and gravel	409-412	Sand, gravel and little clay;
163-180	Packed sand and gravel;	412-461	Packed sand and gravel;
180-217	Sand & gravel;	461-472	Packed sand and coarse gravel;
217-241	Clay, sand and gravel	472-482	Packed sand, gravel & boulders;
241-244	Sand & gravel;		
244-259	Clay-little sand and gravel;	482-489	Gravel

90-127	Sand & coarse gravel	293-311	Sand & gravel
		311-351	Clay
127-140	Sand, Gravel and clay, mixed.	351-353	Clay, sand & gravel
		353-385	Hard clay
140-157	Clay	385-409	Clay, sand & gravel
157-163	Clay, sand and gravel	409-412	Sand, gravel and little clay;
163-180	Packed sand and gravel;	412-461	Packed sand and gravel;
180-217	Sand & gravel;	461-472	Packed sand and coarse gravel;
217-241	Clay, sand and gravel	472-482	Packed sand, gravel & boulders;
241-244	Sand & gravel;	482-489	Gravel
244-259	Clay-little sand and gravel;		
259-270	Packed sand and gravel;		

If reducing strings of casing were cut off, state how cut

Depth from surface cut ft.

Size of casing cut in.

Lap in larger casing ft.

Was adapter or cement used?

If casing was swedged or repaired, state depth, describe repairs and condition in which casing was left and probable future effect:

Mr. Morris ordered well swedged before perforating; found casing O.K. all the way down.

Make drawing of adapter in square, showing dimensions.

Is well straight, top to bottom, and if not, what is the variation

Will there be any detrimental effect on pump, and if so, what effect

Give any additional data which may be of future value

Driller must fill in report as work progresses and report must be complete for his successor.

Date of report August 11, 1924.

B. Hatherley. Driller.

Ventura Street Well

City of Pasadena,
Pasadena, California.

Completed Aug. 6, 1924.
Driller B. Hatherley/

F-22-14

Water Systems Engineering Inc.
3201 Labette Terrace
P.O. Box 700
Ottawa, KS 66067-0700
Phone: 785-242-6166
Fax: 785-242-9411

WATER TREATMENT ANALYSIS AND CONTROL REPORT

David Conner
Battelle
65 West Dayton St.
Pasadena, CA 91105

Date: October 6, 2010

Lab Report No. 18622

Re: City of Pasadena; Ventura No.21; samples dated 9/27/10
Complete Profile (1); P.O. #216906

NA - Not Applicable
ND - Not Detected
*(as $CaCO_3$)

	Ventura No.21		Detection Limits
	220' mg/l	410' mg/l	
pH Value	6.85	6.53	NA
Phenolphthalein Alkalinity*	ND	ND	4 mg/L
Total Alkalinity*	180	108	4 mg/L
Hydroxide Alkalinity	ND	ND	4 mg/L
Carbonate Alkalinity	ND	ND	4 mg/L
Bicarbonate Alkalinity	180	108	4 mg/L
Total Dissolved Solids	705	583	1.0 mg/l
Conductivity (µm or µS/cm)	979	810	NA
ORP (mV)	500	440	0.1 mV
Langelier Saturation Index	-0.65	-1.37	NA
Total Hardness*	392	316	4 mg/L
Carbonate Hardness	180	108	4 mg/L
Non Carbonate Hardness	212	208	4 mg/L
Calcium*	276	184	4 mg/L
Magnesium*	116	132	4 mg/L
Sodium (as Na)	32.0	30.2	5.0 mg/L
Potassium (as K)	3.7	3.3	0.1 mg/L
Chlorides (as Cl)	100	110	2 mg/L
Nitrate (Nitrogen)	12.1	9.4	0.3 mg/L
Chlorine (as Cl)	ND	ND	0.02 mg/L
Dissolved Iron (as Fe^{2+})	ND	ND	0.02 mg/L
Suspended Iron (as Fe^{3+})	0.02	0.03	0.02 mg/L
Iron Total (as Fe)	0.02	0.03	0.02 mg/l
Iron (resuspended)	0.05	0.06	0.02 mg/l
Copper (as Cu)	ND	ND	0.04 mg/L
Manganese (as Mn)	ND	ND	0.1 mg/L
Phosphate (as PO_4)	0.36	1.65	0.06 mg/L
Sulfate (as SO_4)	124	92	2 mg/L
Silica (as SiO_2)	39.1	59.7	1.0 mg/L
Tannin/Lignin	ND	ND	0.1 mg/L
Total Organic Carbon (C)	ND	ND	0.0 mg/l

Bacterial Analysis:

M = Million F = Filtered	Ventura No.21	
	220'	**410'**
Plate Count (colonies/ml)	>1,500	>1,500
Anaerobic Growth	20%	10%
Sulfate Reducing Bacteria	Negative	Negative
Fe / Mn Oxidizing Bacteria	Negative	Negative
ATP (cells per ml) Initial	439,000	365,000
ATP (cells per ml) 24 hour	225,000	243,000
Total Coliform Bacteria	Negative	Negative
E. coli Coliform Bacteria	Negative	Negative
Bacterial Identification	*Acinetobacter calcoaceticus genosp3*	*Pseudomonas aeruginosa; Acinetobacter calcoaceticus/genosp3*

Microscopic Evaluation:

220': Trace of visible bacterial activity, minor number of crystals, trace of iron oxide.
410': Trace of visible bacterial activity, traces of crystals and iron oxide.

Observations and Interpretations:

APPENDIX 2-16: Summary Video Log Inspection Sheets for Ventura Well

Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle,City of Pasadena
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena.Ca.
GPS LOCATION: Latitude: N ° Longitude: W °

WELL NUMBER: Ventura **JOB NUMBER:** 1000-1221

SURVEYED BY: Tim Narwold **DATE:** 21-Jul-09

REVIEWED BY: **WATER LEVEL:** 76'2"

WATER CONDITION: Cloudy/Clear **TOTAL DEPTH:** Unknown

CASING DIAMETER: 19"ID **SURVEY DEPTH:** 441'

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
0-160'	Casing appears to have mild scale and growth.
160-280'	Casing apperars to have moderate scale and growth.
280'	Air line in well.
280-300'	Casing appears to have moderate scale and growth.
300-360'	Casing appears to have mild scale and growth.
360-441'	Casing appears to have heavy scale and growth
	with nodules.
441'	Camera light bar enters fill and will not pass.

Perforation:	
Vertical	160-220'
Mills Nife	
Stainless Steel	200-441'
Wire Wrap	

Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle - JPL Pasadena
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena.Ca.
GPS LOCATION: Latitude: N 34° 11' 38.2 | Longitude: W 118° 10' 08.4

WELL NUMBER: Ventura **JOB NUMBER:** 27-1221

SURVEYED BY: Tom Schuldheiz **DATE:** 5-Aug-09

REVIEWED BY: **WATER LEVEL:** 73' 04"

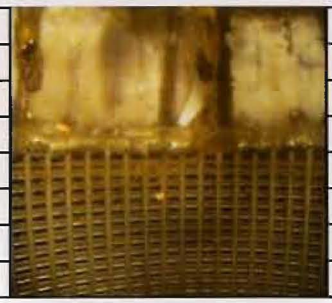
WATER CONDITION: Cloudy/Clear **TOTAL DEPTH:** Unknown

CASING DIAMETER: 19"ID **SURVEY DEPTH:** 437' 1"

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
5' - 73'	Casing appears to have mild scale and growth.
73' 4"	Camera enters static water level.
73' - 218'	Casing appears to have mild scale and growth.
218' - 225'	Casing appears to have moderate scale and growth.
225' - 437'	Possible air hose in well Casing appears to have moderate scale and growth.
437' 01"	Camera comes to rest at fill from the side perspective

Perforation:	
Vertical	160-220'
Mills Knife	
Stainless Steel	200-441'
Wire Wrap	



Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

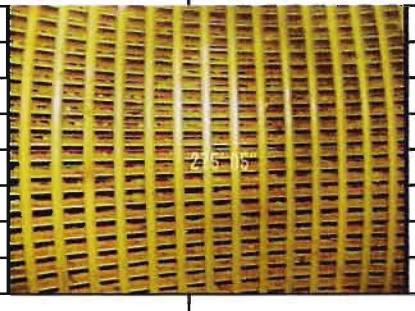
CLIENT: Battelle/JPL Pasadena
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena.Ca.
GPS LOCATION: Latitude: N 34° 11' 38.2 | Longitude: W 118° 10' 08.4

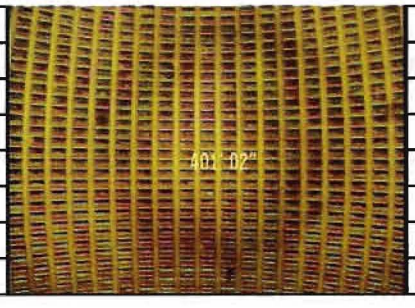
WELL NUMBER: Ventura **JOB NUMBER:** 1000-1968
SURVEYED BY: Daniel De La Rosa **DATE:** 21-May-10
REVIEWED BY: **WATER LEVEL:** 45' 7"
WATER CONDITION: Clear **TOTAL DEPTH:** Unknown
CASING DIAMETER: 19.25" ID **SURVEY DEPTH:** 453' 4"

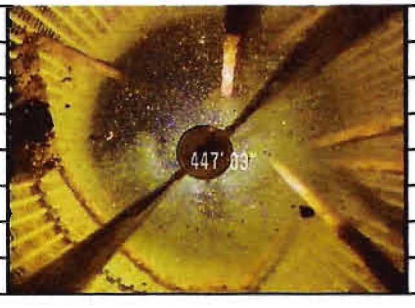
*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
5 - 45'	Casing appears to have mild scale and growth.
45' 7"	Camera enters static water level.
45 - 80'	Casing appears to have mild scale and growth.
80 - 219'	Casing appears to have moderate scale and growth.
219 - 235'	Casing appears to have mild scale and growth.
235 - 247'	Casing appears to have moderate scale and growth.
247 - 253'	Casing appears to have mild scale and growth.
241 - 453'	Multiple pieces of airline in casing.
453' 4"	Light bar comes to rest in fill, video is stopped at side view perspective.

Perforation:	
Wire Wrap	220 - 453'







Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle - JPL Pasadena
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena.Ca.
GPS LOCATION: Latitude: N 34° 11' 38.2 | Longitude: W 118° 10' 08.4

WELL NUMBER: Ventura **After Liner** **JOB NUMBER:** 1000-1968

SURVEYED BY: Jeff Conner **DATE:** 30-Nov-10

REVIEWED BY: **WATER LEVEL:** 61' 4"

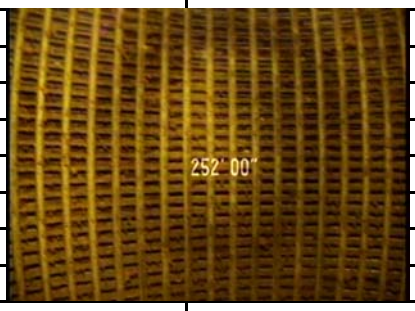
WATER CONDITION: Clear **TOTAL DEPTH:** 460'

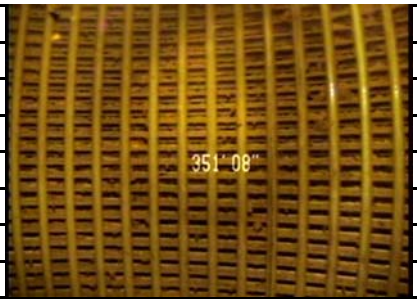
CASING DIAMETER: 19.25" ID **SURVEY DEPTH:** 454'

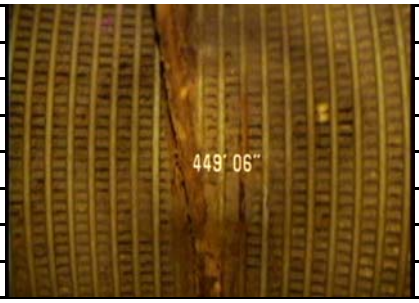
*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
5 - 61'	Casing appears to have mild growth.
61' 4"	Camera enters static water level.
61 - 180'	Casing appears to have mild growth.
180 - 222'	Casing appears to have moderate scale and growth.
222 - 454'	Casing appears to have mild growth and gravel pack visible behind screen.
444 & 451'	Pipe in casing.
454'	Camera comes to rest at top of fill.

Perforation:	
Stainless Steel Wire Wrap	222 - 460'







APPENDIX 2-17: Daily Field Notes/Log Sheets for Ventura Well

MHTS Municipal Production Well Log Sheet - Ventura

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	GPM	Totalizer (x 100) Start	Totalizer (x 100) Finish	Daily Volume Purged (Gallons)	Generator Hour Meter Beginning of Day	Generator Hour Meter End of Day	Comments
5-18-10	460 Bottom	14:05	14:13	OEAL		013032	—		043265	—	Air lift the Bottom Stop to fix Leak
5-18-10	460	14:21	14:35	OEAL		—	013067		—	—	Air lift to the Bottom
5-18-10	460	15:10	15:53	OEAL		013067	013120		—	043288	Air lift to the Bottom
5-19-10	460	10:36	11:22	OEAL		013125	013168		043305	—	Air lift to the Bottom
5-19-10	460	11:27	1:07	OEAL		013168	0132300		—	043346	SAND & SCALE
5-24-10	218 TO 228	11:02	11:30	Dual Swab		013299	013344		4334.6	4336.2	Air Lift from Top
5-24-10	228 to	12:30	16:00	Dual Swab		013344	013610		4336.2	4339.9	31,100 gal. 10 Zones
5-25-10	318 328	8:30	9:15	DSAL		013610	013674		043399	—	
5-25-10	338 348	9:20	10:10	DSAL		013674	013675		—	—	
5-25-10	358 378	10:30	11:18	DSAL		013675	013804		—	—	
5-25-10	378 388	12:16	12:42	DSAL		013675	013681		—	—	
5-25-10	388 398	12:49	1:00	DSAL		013681	013682		—	—	
5-25-10	398 408	1:22	1:40	DSAL		013682	013684		—	—	
5-25-10	408 418	1:40	2:01	DSAL		013684	013790		—	—	
5-25-10	418 428	2:15	2:35	DSAL		013790	013810		—	—	
5-25-10	428 438	2:39	2:50	DSAL		013810	013890		—	—	
5-25-10	438 448	3:00	3:21	DSAL		014022	—		—	043464	
5-25-10						013610	014022		04339.9	04346.4	411,200
						ST Day	End Day				

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Ventura

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100)		Generator Hour Meter		Comments
							Start	Finish	Beginning of Day	End of Day	
5-24-10	218-228	11:02	11:15	DSAL	13		13300	—			
5-24-10	228-238	11:15	11:30	DSAL	15			NR			
5-24-10	238-248	12:30	12:48	DSAL	18		NOT RECORDED	NR			
5-24-10	248-258	12:48	13:03	DSAL	15			NR			
5-24-10	258-268	13:18	13:36	DSAL	18			NR			
5-24-10	268-278	13:36	13:52	DSAL	16			NR			
5-24-10	278-288	14:06	14:29	DSAL	23			NR			
5-24-10	288-298	14:29	14:57	DSAL	28			NR			
5-24-10	298-308	15:11	15:37	DSAL	26			NR			
5-24-10	308-318	15:37	15:56	DSAL	19			13610			41,200 gallons
5-25-10	318-328	08:33	08:53	DSAL	20		13610	NR			
5-25-10	328-338	08:53	09:14	DSAL	21		NR	NR			
5-25-10	338-348	09:28	09:58	DSAL	30		NR	NR			
5-25-10	348-358	09:58	10:13	DSAL	15		NR	NR			
5-25-10	358-368	10:26	10:51	DSAL	25		NR	NR			
5-25-10	368-378	10:51	11:18	DSAL	27		NR	NR			
5-25-10	378-388	12:16	12:42	DSAL	26		NR	NR			
5-25-10	388-398	12:42	13:00	DSAL	18		NR	NR			

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump
NR = Not recorded

MHTS Municipal Production Well Log Sheet - Ventura

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100)		Generator Hour Meter		Comments
							Start	Finish	Beginning of Day	End of Day	
5-25-10	398-408	13:22	13:40	DSAL	18		—	—			
5-25-10	408-418	13:40	14:01	DSAL	21		—	—			
5-25-10	418-428	14:15	14:35	DSAL	20		—	—			
5-25-10	428-438	14:35	14:50	DSAL	15		—	—			
5-25-10	438-448	15:00	15:21	DSAL	39		—	14022			
6-3-10	218-228	15:27	16:01	DSAL	34		014022	014089	043470	043477	Beginning PH=7 Brown WATER while swabing
6-4-10	228-238	07:30	07:45	DSAL	15		014089	014111	043477	—	PH=7 / CHLORINE 0.00
6-4-10	238-248	08:09	08:24	DSAL	15		014111	014135	—	—	PH=7/6
6-4-10	248-258	08:38	09:02	DSAL	24		014135	014171	—	—	
6-4-10	258-268	09:25	09:55	DSAL	30		014171	014216	—	—	PH 7.0 | ZONE 258-268
6-4-10	268-278	10:13	10:37	DSAL	24		014216	014255	—	—	
6-4-10	278-288	10:55	11:16	DSAL	39		014255	014287	—	—	PH 7 /
6-4-10	288-298	12:20	12:39	DSAL	19		014287	014319	—	—	2ML SILT & SAND
6-4-10	298-308	12:59	13:17	DSAL	18		014319	014347	—	—	
6-4-10	308-318	13:38	13:55	DSAL	20		014347	014376	—	—	
6-4-10	318-328	14:12	14:38	DSAL	26		014376	014416	—	043551	

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Ventura

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100)		Generator Hour Meter		Comments
							Start	Finish	Beginning of Day	End of Day	
5-27-10							014022		043465		

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Ventura

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100)		Generator Hour Meter		Comments
							Start	Finish	Beginning of Day	End of Day	
6-7-10	328-338	10:15	10:31	DSAL	16	262	014416	014458	043551	—	chlorine=0.0 PH=7
6-7-10	338-348	10:56	11:23	DSAL	27		014458	014501	—	—	PH=7 chlorine=0.0
6-7-10	348-358	12:13	12:26	DSAL	13		014501	014528	—	—	PH=7 chlorine=0.00
6-7-10	358-368	12:45	13:10	DSAL	25		014528	014567	—	—	
6-7-10	368-378	13:28	13:43	DSAL	15		014567	014592	—	—	
6-7-10	378-388	14:02	14:24	DSAL	22		014592	014625	—	—	
6-7-10	388-398	14:38	14:55	DSAL	17		014625	014653	—	—	PH=7 Chlorine=0.00
6-7-10	398-408	15:09	15:23	DSAL	14		014653	014677	—	—	PH=7
6-7-10	408-418	15:40	16:00	DSAL	20		014677	014709	—	043613	29,300 gal.
6-8-10	418-428	07:52	08:17	DSAL	25		014709	014751	043613	—	
6-8-10	428-438	08:37	09:02	DSAL	24		014751	014789	—	—	
6-8-10	438-448	09:17	09:37	DSAL	20		014789	014816	—	043655	Finish with well

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

Layne Christensen Company

Date: 9-13-10 Page 1

Customer: BATTELLE / JPL. VENTURA WELL

Job No. 27- 1000-1968

Meter 10" X 1000

Static level 57.0 Feet

Airline depth _____ Feet

Hours/Page _____

Total hours _____

G.P.D. _____

Operator: J. ALBA.

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments	FAU	TSS
9:00			57.0				METER READING. 016252.9		
START. 11:00									
11:15	46.57	362.5	67.33	10.33	729	35.09	SOME color 256.2		
			SURGE x 3						
11:19			RESUME Pumping				256.8		
11:32	42.4	680.0	77.43	20.43	817	33.28	SOME color 267.0		
			SURGE x 3						
11:37			RESUME Pumping				267.0		
11:52	22.96	673.33	77.76	20.76	818 QT	32.43	CLR 277.1		
12:07	5.3	920.0	88.37	31.37	950	29.32	CLR 290.9		
			SURGE x3						
12:10			RESUME Pumping				291.0		
12:25	14.13	893.33	88.31	31.31	951	28.53	CLR 304.4		
			SURGE x3						
12:28			RESUME Pumping				305.0		
12:43	10.6	880.0	88.27	31.27	951	28.14	CLR 318.2		
			SURGE x 3						
12:46			RESUME Pumping				318.3		
1:01	8.83	906.66	88.37	31.37	951	28.90	CLR 331.9		
			SURGE x 3						
1:04			RESUME Pumping				332.3		
1:19	10.6	1113.33	98.68	41.68	1054	26.71	CLR 349.0		
			SURGE x 3						
1:22			RESUME Pumping				349.4		
1:37	14.13	1126.66	99.0	42.0	1054	26.82	CLR 366.3		
			SURGE x 3						
1:40			RESUME Pumping				366.5		
1:55	10.6	1133.33	99.1	42.1	1055	26.92	CLR 383.5		
			SURGE x 3						
1:58			RESUME Pumping				383.7		
2:13	6.71	1120.0	99.26	42.26	1054	26.50	CLR 400.5		
			SURGE x 3						

Layne Christensen Company

Date: 9-13-10 Page 2

Customer: BATTELLE / J.P.L VENTURA WELL Job No. 27- 1000-1968

Meter 10" X 1000 Static level 57.0 Feet Airline depth _____ Feet

Hours/Page _____ Total hours _____ G.P.D. 295,100.0

Operator: J. ARX.

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments		FAU	TSS
2:16			RESUME	Pumping				401.0		
2:31	9.89	1426.66	114.45	57.45	1151	24.83	CLR	422.4		
			SURGE X	4						
2:35			RESUME	Pumping				422.9		
2:50	12.36	1440.0	114.62	57.62	1150	24.99	CLR	444.5		
			SURGE X	4						
2:54			RESUME	Pumping				445.1		
3:09	10.6	1426.66	114.45	57.45	1150	24.83	CLR	466.5		
			SURGE X	4						
3:13			RESUME	Pumping.				467.3		
3:28	15.9	1640.0	125.0	68.0	1249	24.11	CLR	491.9		
			SURGE X	4						
3:32			RESUME	Pumping				492.6		
3:47	10.24	1626.66	125.26	68.26	1251	23.83	CLR	517.0		
3:49		INCREASE FLOW TO 1700-1800 GPMS						520.5		
4:04	17.66	1806.66	137.0	80.0	1353	22.58	CLR	547.6		

Layne Christensen Co.

Test Pump Data

Page ___of___

Customer EPL Date 9-13-10 Job Number _____

Well Diameter _____ Depth of Well _____ Static Water Level _____ Well # and Name _____

Pump Setting _____ Airline Depth _____ Flowmeter: Start _____ End _____

How Q Measured _____ How W.L.s measured _____ Test Type: Development___ StepDraw-Down___ Production___

Total Hours This Sheet _____ Person Conducting Well Test VENTURA

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
TEST ENG.	R.P.M. GAS						
R.P.M. WELL	BOOST	FLO	V.F.O BOOST.				ORANGE RUSTY SHIT BEING BACKWASHED
10.54	1520	1150	36.5 HZ				
1151	1713 ~~1760~~	1400	38.9				
1249	1950	1600	40.4 HZ				
1353	2040	1900	42 HZ				

Layne Christensen Co. 1600 900 1600 1900

Test Pump Data

Customer EPL BATTELLE Date 9-14-10 Job Number 1000-1968

Well Diameter ____ Depth of Well ____ Static Water Level 53.6' Well # and Name VENTURA WELL

Pump Setting 400' Airline Depth ____ Flowmeter: Start 016548.000 End ____

How Q Measured METER How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down ___ Production ___

Total Hours This Sheet ____ Person Conducting Well Test ____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
8:38		5 SURGES & START					
8:58	.11 2.9 PPM	1440	47.2'	100.8'	30.50	1153	CLEAR IT'S GOT A VERY SMALL AMT. OF AIR AT ALL FLOWS.
9:02	START AFTER 3 SURGES						CLEAR
9:22	.2.2 2.9 PPM	1587	53.3'	106.9	29.77	1201	CLEAR
9:26	START AFTER 3 SURGES					1	CLEAR
9:46	.40 4.77 PPM	1630	56.4	109.0	28.90	1224	CLEAR SMALL AMT. AIR.
							CRYSTAL CLEAR WITH SMALL AMT. AIR.

Layne Christensen Company

Date: 9-14-10 Page _____

Customer: BATTELLE/JPL. VENTURA WELL

Job No. 27-1000-1968

Meter 10" X 1000

Static level 57.0 Feet
Airline depth _____ Feet

Hours/Page _____
Total hours _____
G.P.D. _____

Operator: J. ABA.

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments		FAU	TSS
10:00			RESUME	Pumping				643.3		
10:15	7.06	1646.66	121.76	64.76	1249	25.42	CLR.	668.0		
			SURGE X 3							
10:18			RESUME	PUMPING				668.2		
10:33	6.71	1623.33	123.0	66.0	1251	24.74	CLR	692.7		
			SURGE X 3							
10:36			RESUME	Pumping	(BY PASSING		FILTERS)	693.5		
10:51	5.3	1646.66	124.8	67.8	1251 QT	24.28	CLR	718.2		
11:06	3.53	1813.33	133.35	76.35	1325 QT	23.75	CLR	745.4		
			SURGE X 3							
11:10			RESUME	PUMPING				746.6		
11:25	13.78	1993.33	143.83	86.83	1416	22.26	CLR	776.5		
11:40	10.6	1966.66	145.2	88.2	1416 QT	22.29	CLR	806.0		
11:55	8.48	2106.66	155.25	98.25	1501	21.44	CLR	837.6		
12:10	9.76	2131.57	156.63	99.63	1501	21.39	CLR	878.1		
12:25	4.48	2115.38	157.31	100.31	1501 QT	21.08	CLR	905.6		
12:47			RESUME	PUMPING	(THRU	FILTERS)		908.1		
1:02	6.71	1806.66	135.0	78.0	1331	23.16	CLR	935.2		
1:17	2.82	1786.66	135.83	78.83	1331	22.66	CLR	962.0		
1:32	1.76	1766.66	136.23	79.23	1331	22.29	CLR	988.5		
			SURGE X 3							
1:35			RESUME	PUMPING				16989.5		
1:50	17.6	2066.66	150.57	93.97	1475	21.99	CLR	17020.5		
[illegible]			SURGE X	1	[illegible]		[illegible]			
1:59			RESUME	Pumping				31.6		
2:07	33.12	2325.0	164.45	107.45	1601	21.63	CLR	50.2		
			SURGE X	1						
2:12			RESUME	Pumping				51.3		
2:23	28.42	2245.45	165.51	108.51	1598	20.69	CLR	76.0		
			SURGE X	1						
2:36			RESUME	PUMPING.				77.3		
2:42	17.6	2300.0	165.0	108.0	1602	21.29	CLR	91.1		

Layne Christensen Company

Date: 9-14-10 Page _____

Customer: BATTELLE / JPL. VENTURA WELL

Job No. ~~27~~- 1000 - 1968

Meter 10" X 1000

Static level 57.0 Feet

Airline depth _____ Feet

Hours/Page _____

Total hours _____

G.P.D. _____

Operator: J. ALBA

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments		FAU	TSS
2:53	9.63	1218.18	Ø	Ø	1602	Ø	CLR	109.0		
3:00	5.3	2228.57	166.55	109.55	1604	20.34	CLR	124.6		
			SURGE X	1						
3:15			RESUME	PUMPING.				128.3		
3:32	12.47	2288.23	167.83	110.83	1600	20.64	CLR	167.2		

Layne Christensen Company

Date: 9-15-10 Page _____

Customer: BATTELLE / JPL. VENTURA WELL

Job No. ~~27~~- 1000-1965

Meter 10" X 1000

Static level 58.15 Feet

Airline depth _____ Feet

Hours/Page _____

Total hours _____

G.P.D. _____

Operator: J. AVRA

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	(STEP #1) Comments		FAU	TSS
7:30			58.15				METER READING	017167.4		
START 8:00										
8:05	15.9	1000.0	91.4	33.25	1085	30.07	CLR	171.5		
8:10	1.06	1020.0	93.0	34.85		29.26	CLR	176.6		
8:15	TRACE	1020.0	93.82	35.67		28.59	CLR	181.7		
8:25	TRACE	1020.0	95.46	37.31		27.33	CLR	191.9		
8:35	Θ	1020.0	96.0	37.85		26.94	CLR	202.1		
8:45	Θ	1040.0	96.5	38:35	1085	26.62	CLR	212.5		
9:00	Θ	1034.48	97.0	38.85		26.61	CLR	227.5		
9:15	Θ	1013.33	97.45	39.3		25.78	CLR	242.7		
9:30	Θ	1006.66	97.81	39.66		25.38	CLR	257.8		
9:45	Θ	1026.66	98.1	39.95		25.69	CLR	273.2		
10:00	Θ	1006.66	98.32	40.15	1085	25.07	CLR	288.3		
							(STEP #2)			
10:05	TRACE	1340.0	111.69	53.54	1099	25.02	CLR	295.0		
10:10	TRACE	1340.0	111.95	53.8		24.90	CLR	301.7		
10:15	Θ	1260.0	111.5	53.35		23.61	CLR	308.0		
10:25	Θ	1320.0	111.72	53.57		24.64	CLR	321.2		
10:35	Θ	1290.0	112.0	53.85		23.95	CLR	334.1		
10:45	Θ	1260.0	112.35	54.2		23.24	CLR	346.7		
11:00	Θ	1313.33	112.67	54.52	1099	24.08	CLR	366.4		
11:15	Θ	1286.66	113.0	54.85		23.45	CLR	385.7		
11:30	Θ	1286.66	113.15	55.0		23.39	CLR	405.0		
11:45	Θ	1286.66	113.33	55.18		23.31	CLR	424.3		
12:00	Θ	1286.66	113.46	55.31	1099	23.26	CLR	443.6		

Layne Christensen Company

Date: 9-15-10 Page

Customer: BATTELLE / JPL. VENTURA WELL

Job No. 27- 1000-1968

Meter 10" X 1000

Static level 58.15 Feet

Airline depth Feet

Hours/Page

Total hours

G.P.D. 711,600.0

Operator: J. ALBA

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	(STEP #3) Comments		FAU	TSS
12:05	TRACE	1520.0	128.0	69.85	1247	21.76	CLR	451.2		
12:10	TRACE	1580.0	128.58	70.43		22.43	CLR	459.1		
12:15	TRACE	1620.0	129.0	70.85		22.86	CLR	467.2		
12:25	0.53	1620.0	129.43	71.28		22.72	CLR	483.4		
12:35	TRACE	1610.0	129.77	71.62		22.47	CLR	499.5		
12:45	Ø	1590.0	130.1	71.95	1247	22.09	CLR	515.4		
1:00	Ø	1600.0	130.37	72.22		22.15	CLR	539.4		
1:15	Ø	1593.33	130.75	72.6		21.94	CLR	563.3		
1:30	Ø	1593.33	131.0	72.85		21.87	CLR	587.2		
1:45	Ø	1600.0	131.25	73.1		21.88	CLR	611.2		
2:00	Ø	1600.0	131.4	73.25	1247	21.84	CLR	635.2		
							(STEP #4)			
2:05	TRACE	2000.0	153.36	95.21	1461	21.00	CLR	645.2		
2:10	5.3	2020.0	153.91	95.76		21.09	CLR	655.3		
2:15	5.3	2020.0	154.45	96.3		20.97	CLR	665.4		
2:25	3.71	2050.0	155.0	96.85		21.16	CLR	685.9		
2:35	2.65	2030.0	155.6	97.45		20.83	CLR	706.2		
2:45	3.18	2020.0	155.93	97.78		20.65	CLR	726.4		
3:00	0.70	2026.66	156.56	98.41	1461	20.59	CLR	756.8		
3:15	1.76	2026.66	157.0	98.85		20.50	CLR	787.2		
3:30	1.06	2013.33	157.25	99.1		20.31	CLR	817.4		
3:45	0.35	2020.0	157.55	99.4		20.32	CLR	847.7		
4:00	Ø	2020.0	157.8	99.65	1461	20.27	CLR	878.0		
							FINAL TOTALIZER			
							017879.0			

Layne Christensen Co.

Test Pump Data

Page ___ of ___

Customer BATTELLE J.P.L. Date 9-21-10 Job Number 1000-1968

Well Diameter _____ Depth of Well _____ Static Water Level 59.3' Well # and Name VENTURA

Pump Setting 202' Airline Depth _____ Flowmeter: Start 017879 000 End _____

How Q Measured METER 10" McCROM. How W.L.s measured ELECT. Test Type: Development___ StepDraw-Down___ Production ✓

Total Hours This Sheet _____ Person Conducting Well Test B. PORTER

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS	
8:00	VITALS	GATE	THRU	FILTERS				17879000
						FIXED		
9:00	START	THRU	FILTERS	@ 5 MINS		1770 WENT	TO FOREBAY.	
9:05	.07 7.42 PPM	2000	78.1'	137.4'			27 LBS DIS. CLEAR	
9:10	.07	1980	81.0'	140.3'	24.44		27 LBS DISC. CLEAR	
9:15	.09 1.06 PPM	1960	82.6'	141.9'	23.72		" " " BOOSTER DISCH. 59 LBS	17908930
9:30	.10 .35 PPM	1964	83.9'	143.2'	23.40		26 LBS DISC CLEAR	17938400
9:45	.11 .35 PPM	1960	85.0'	144.3'	23.05		26 LBS DISC. CLEAR	17966800
10:00	.11	1945	85.4'	144.7'	22.77		26 LBS " "	17996800
10:30	.11	1934	86.7'	146.0'	22.30		26 LBS " "	18054800
11:00	.125 .106 PPM	1906	87.4'	146.7'	21.80		24 LBS " "	18102000
#3 BOOSTER. AIR COND 120°. SWITCH TO #2 BOOSTER 65°								
11:30	.130 .88 PPM	1902	87.6'	146.9'	21.71		24 LBS " "	18169070
12:00	.130 .88 PPM	1896	87.9'	147.2'	21.56		24 LBS " CLEAR	18225950
12:30	.14 .88 PPM	1893	88.4'	147.7'	21.41		23.5 " CLEAR	18282750
1:00	.145 .88 PPM	1888	88.7'	148.0'	21.28		23.5 " CLEAR	18339400
1:30	—	1880	89.1'	148.4'	21.09		23.5 " CLEAR BOOST. DISC. 59 LBS.	18395800
2:00	.15 .04 PPM	1878	89.3'	148.6'	21.03		23.5 LBS. " WATER TEMP. 64° FAHR.	18452150
2:30	—	1876	89.6'	148.9'	20.93		23.5 LBS. CLEAR P.H. 6.5	18508450
3:00	—	1875	89.8'	149.1	20.87		23.0 LBS CLEAR	18564700
3:30	.155 .029 PPM	1870	90.1'	149.4	20.75		23.0 LBS. CLEAR	18620800
4:00	—	1870	90.2'	149.5	20.73		23.0 LBS CLEAR	18676900
5:00	.16 .029 PPM	1865	90.7'	150.0	20.56		22.0 LBS. CLEAR	18788800
							(8 HR. AVG. FLO 1895.4 G.P.M.)	

Layne Christensen Company

Date: 9-21-10 Page _____

Customer: BATTELLE / JPL VENTURA WELL

Job No. 27-1000-1962

Meter 10" X 1000

Static level 59.3 Feet

Airline depth _____ Feet

Hours/Page _____

Total hours _____

G.P.D. _____

Operator: J. ALBA

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	~~Engine RPM.~~ BOOSTER HZ	Specific Capacity	Comments	FAU	TSS
6:00	TRC.	1861.66	150.55'	91.25'	ELECTRIC MOTOR	20.40	CLR (SHIFT CHANGE) 18900.5		
7:00	Θ	1858.33	150.58'	91.28'	42.6HZ	20.35	CLR 19012.0		
8:00	Θ	1853.33	150.25'	90.95'	42.6HZ	20.37	CLR 123.2		
9:00	Θ	1850.0	149.37'	90.07'	42.6HZ	20.53	CLR (SWAPPED SOUNDERS) 234.2		
10:00	Θ	1848.33	149.45'	90.15'	42.6HZ	20.50	CLR 345.1		
11:00	Θ	1846.66	149.54'	90.23'	42.6HZ	20.46	CLR 455.9		
12:00	Θ	1836.66	149.73'	90.43'	42.6HZ	20.31	CLR 9-22-10 566.1		
1:00	Θ	1841.66	149.82'	90.52'	42.6HZ	20.34	CLR 676.6		
2:00	Θ	1837.70	149.90'	90.6'	42.4HZ	20.28	CLR +1MIN 788.7		
3:00	Θ	1837.28	149.90'	90.6'	42.4HZ	20.27	CLR -1MIN 19897.1		
4:00	Θ	1836.66	149.95'	90.65'	42.4HZ	20.26	CLR 20007.3		
5:00	Θ	1836.66	150.0'	90.7'	42.4HZ	20.24	CLR 117.5		
6:00	Θ	1830.0	150.15'	90.85'	42.4HZ	20.14	CLR 20227.3		
	SHIFT CHANGE				AVG. FLO 12 HRS = 1842.7 G.P.M.				
7:00	—	1830	150.2'	90.90'		20.12	22LBS DISC. CLEAR 20337.150		
8:00	—	1830	150.3'	91.0'		20.10	22LBS DISC. CLEAR 20447.000		
9:00		1830	150.35'	91.05'		20.09	22LBS DISC. CLEAR 20556.950		
10:00		1830	150.4'	91.10'		20.08	" " " 20666.700		
10:02	SHUT DOWN SPINNER TOOL STUCK AT ACCESS PORT								
10:04	SURGE WELL 1 TIME								
					2,787,700 GALLON PUMPED IN 25 HRS.				
			10" COLUMN		COLUMN VELOSITY 7.65 FT./SEC.				
					AVERAGE FLO 1858.5 G.P.M.				

110.5

MAJESTIC PRINT (951) 509-2539

Layne Christensen Co.

Test Pump Data

Page ___ of ___

Customer BATTELLE J.P.L Date 9-27-10 Job Number 1000-1968

Well Diameter 20" Depth of Well 453.0' Static Water Level 60.1' Well # and Name VENTURA

Pump Setting 210.0' Airline Depth NONE Flowmeter: Start 020669500 End _____

How Q Measured METERED 10" McCROM. How W.L.s measured ELECT Test Type: Development___ StepDraw-Down___ Production___

Total Hours This Sheet _____ Person Conducting Well Test _____

20669500

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS	
		SPECIAL START FOR SPINNER & THIEF SAMPLES						
7:55		START					CLEAR	
8:00	12 PPM	2000	80.8'	142.9'			TO SYSTEM	
8:05	3 PPM	1980	83.2'	143.3'	23.79			
8:10	1 PPM	1970	85.4'	145.5'	23.06		BOOSTER DISC. 62 LBS.	20703900
8:20	.6 PPM	1970	87.0'	147.1'	22.64			20724000
8:35	.2 PPM	1960	87.5'	147.6'	22.40		BOOST. DISC. 63 LBS.	20753900
8:55	.2 PPM	1955	88.0'	148.1'	22.21		" " " CLEAR	20793500
9:25	.1 PPM	1955	88.6'	148.7'	22.06		BOOST. DISC. 63 CLEAR	20850700
9:55	-	1945	89.6'	149.7'	21.70		BOOST DISC. 62 LBS CLEAR	
10:25	.1 PPM	1940	90.1'	150.2'	21.53		" " " "	20968800
10:55	.05 PPM	1920	91.6'	151.7'	20.96		BOOST DISC. 62 LBS CLEAR	21026900
11:55	.05	1905	91.9'	152.0'	20.72		" " " "	
12:55	-	1900	92.3'	152.4'	20.58		11:55 SPINNER TEST START	21257250
1:55	-	1897	92.7	152.8'	20.46		PULLING SAMPLES	
2:55	-	1894	92.9	153.0'	20.38		" "	21486000
3:50		1890	93.2	153.3'	20.27		" "	
4:55		1885	93.9	154.0				21712900
5:07	SHUT DOWN							21735500
							1,066,000 GAL PUMPED TODAY	

PACIFIC SURVEYS

SPINNER
DOWN RUNS
PUMPING CONDITION

Job No.
15497

File No.

Company LAYNE CHRISTENSEN
Well VENTURA
Field ALTADENA
County LOS ANGELES State CA

Location:

GPS:N34o11'38.2" W118o10'08.3"

Sec. Twp. Rge.

Other Services:

STOP COUNTS
SPINNER ANALYSIS
SAMPLING

Permanent Datum	G.L.		Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'		K.B.
Drilling Measured From	G.L.			D.F.
				G.L.

Date	9/27/2010		
Run Number	ONE		
Depth Driller	453'		
Depth Logger	453'		
Bottom Logged Interval	450'		
Top Log Interval	217'		
Pump Set @	212'		
Time Pumping Prior to Survey	3 HOURS		
Pumping Water Level	151'		
Max. Recorded Temp.	N/A		
Pump Rate (GPM)	1930'		
Time Well Ready	11:00 AM		
Time Logger on Bottom	11:30 AM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/AFOH		
Witnessed By	PORTER		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	220'	450'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	20"	N/A	0'	453'
Liner				

<< Fold Here >>>

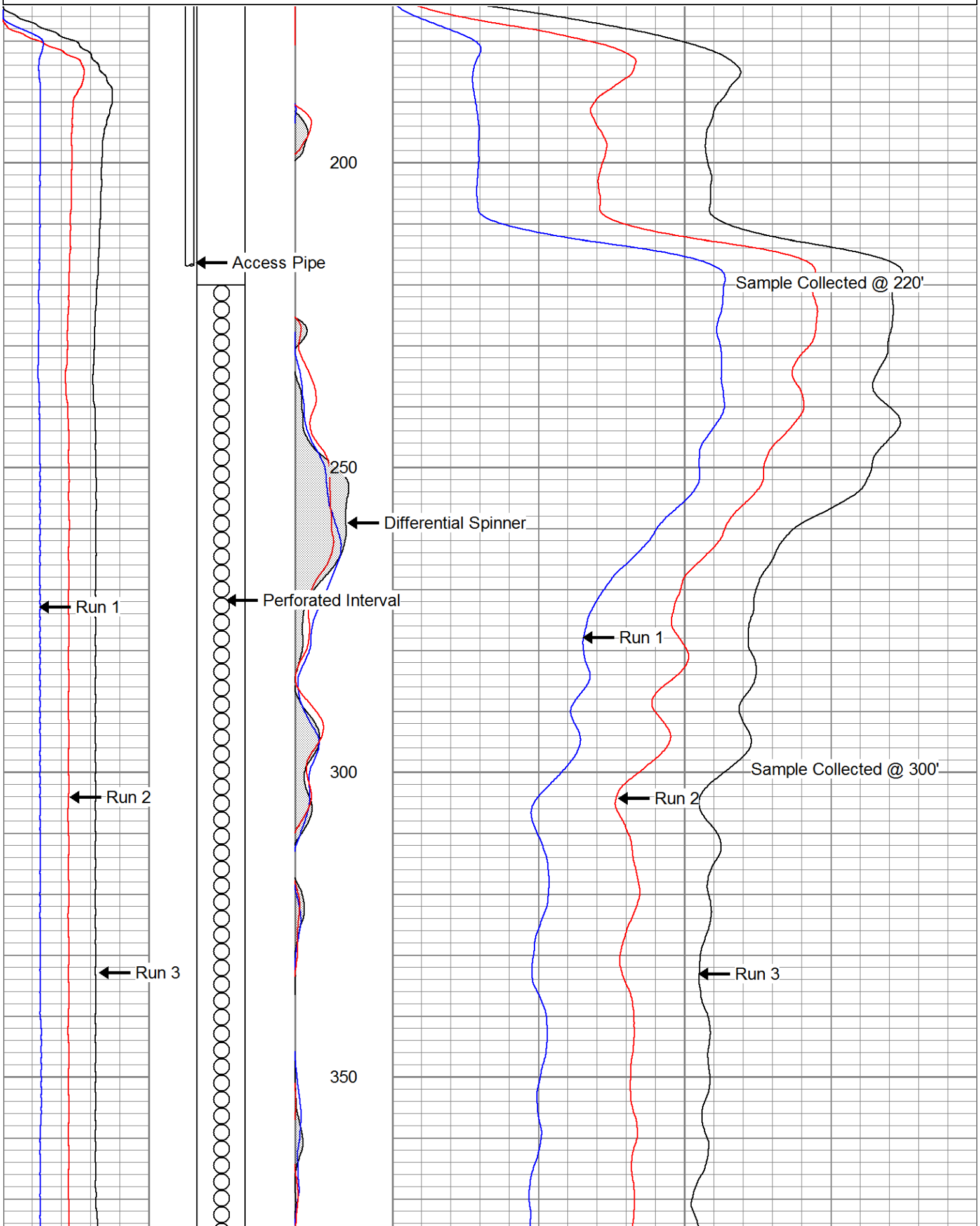
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

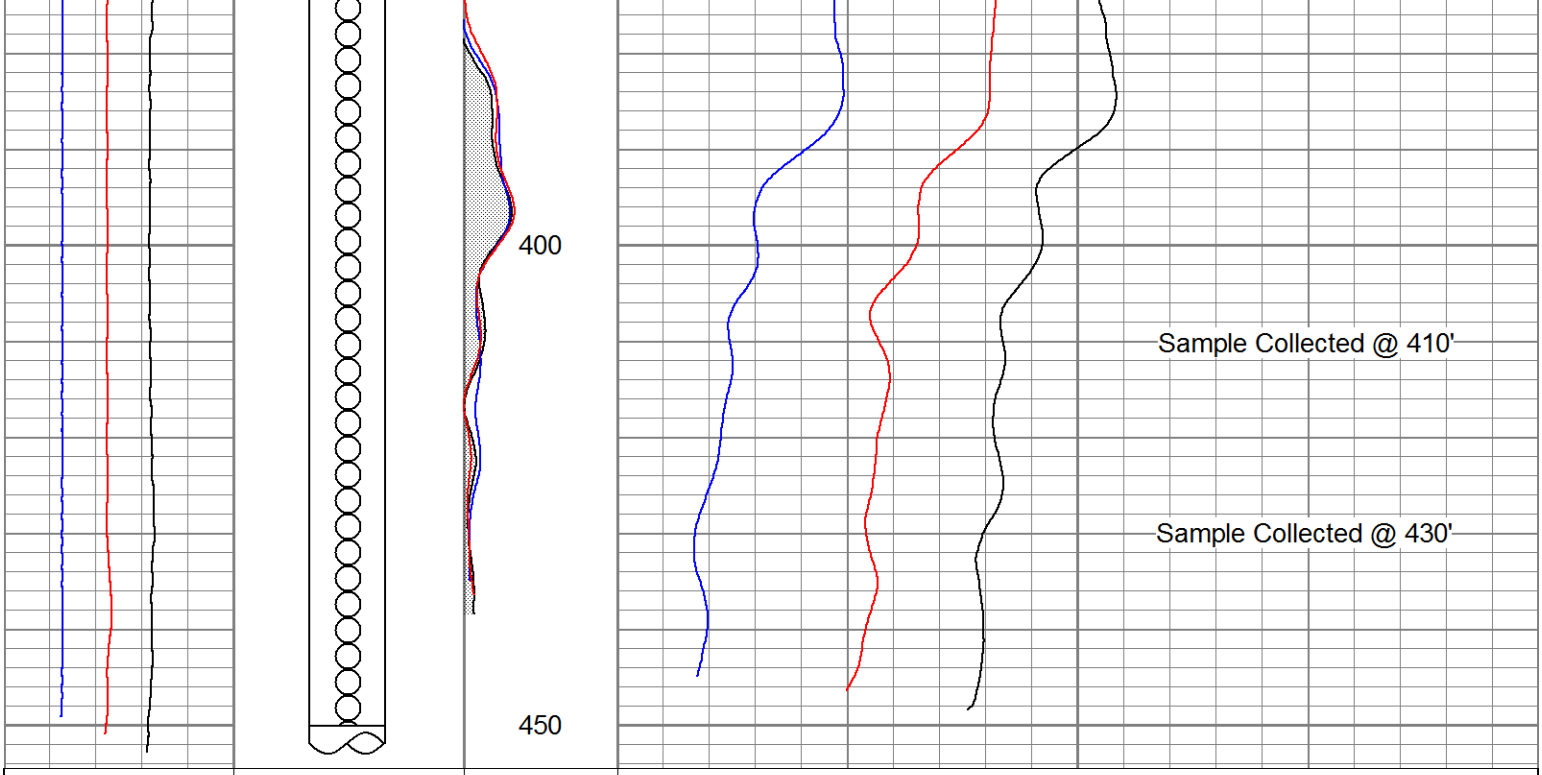
Comments

SAMPLES COLLECTED @ 330', 440', 500', 580'

Database File: 15497.db
Dataset Pathname: spn5
Presentation Format: spinmerg
Dataset Creation: Mon Sep 27 12:44:04 2010 by Log Open-Cased 090629
Charted by: Depth in Feet scaled 1:240

0	LS (ft/min) 150	CSG SCHDL	Delta Spin	0	Spinner Down Run (cps)	80
0	LS (ft/min) 150		Delta Spin	0	Spinner Down Run (cps)	80
0	LS (ft/min) 150		Delta Spin	0	Spinner Down Run (cps)	80





0	LS (ft/min) 150	CSG SCHDL	Delta Spin	0	Spinner Down Run (cps)	80
0	LS (ft/min) 150		Delta Spin	0	Spinner Down Run (cps)	80
0	LS (ft/min) 150		Delta Spin	0	Spinner Down Run (cps)	80

PACIFIC SURVEYS

SPINNER
STOP COUNTS
PUMPING CONDITION

Job No.
15497

File No.

Company LAYNE CHRISTENSEN
Well VENTURA
Field ALTADENA
County LOS ANGELES State CA

Location:

GPS:N34o11'38.2" W118o10'08.3"

Sec. Twp. Rge.

Other Services:

DYNAMIC SPINNER
SPINNER ANALYSIS
SAMPLING

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'	K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	9/27/2010		
Run Number	ONE		
Depth Driller	453'		
Depth Logger	453'		
Bottom Logged Interval	450'		
Top Log Interval	217'		
Pump Set @	212'		
Time Pumping Prior to Survey	3 HOURS		
Pumping Water Level	151'		
Max. Recorded Temp.	N/A		
Pump Rate (GPM)	1930'		
Time Well Ready	11:00 AM		
Time Logger on Bottom	11:30 AM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/AFOH		
Witnessed By	PORTER		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	220'	450'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	20"	N/A	0'	453'
Liner				

<< Fold Here >>>

All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

Comments

SAMPLES COLLECTED @ 330', 440', 500', 580'

Database File: 15497.db
Dataset Pathname: stop9
Presentation Format: spnstop
Dataset Creation: Mon Sep 27 13:25:58 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)
0	220		16.47
			32.00
60	220		29.57
			29.15
120	220		33.23
			32.25
180	220		31.94
			34.06
240	220		35.74
			30.99
300	220		30.30
			31.15
360	220		32.22
			31.69
420	220		28.92
			31.28
480	220		30.87
			31.59
540	220		32.93
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)

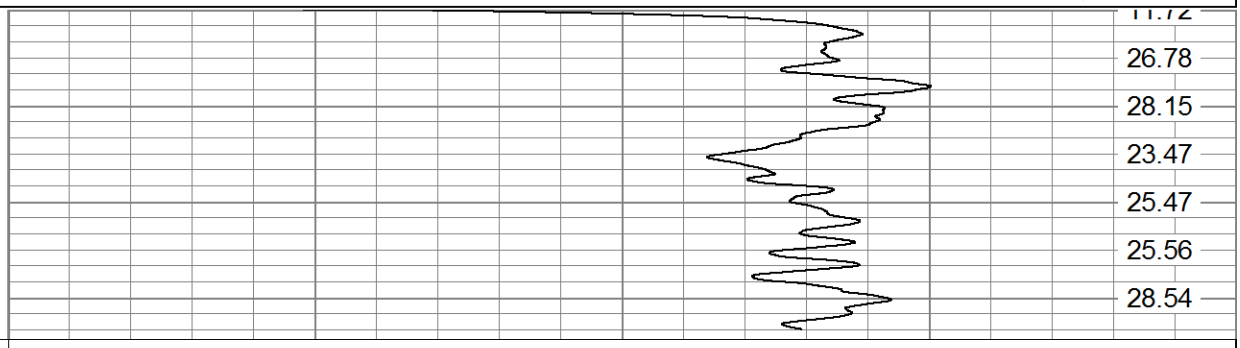
Database File: 15497.db
Dataset Pathname: stop8
Presentation Format: spnstop
Dataset Creation: Mon Sep 27 13:17:02 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)
0	230		15.67
			31.28
60	230		33.82
			31.56
120	230		30.89
			31.04
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)

Database File: 15497.db

Dataset Pathname: stop7
Presentation Format: spnstop
Dataset Creation: Mon Sep 27 13:13:05 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

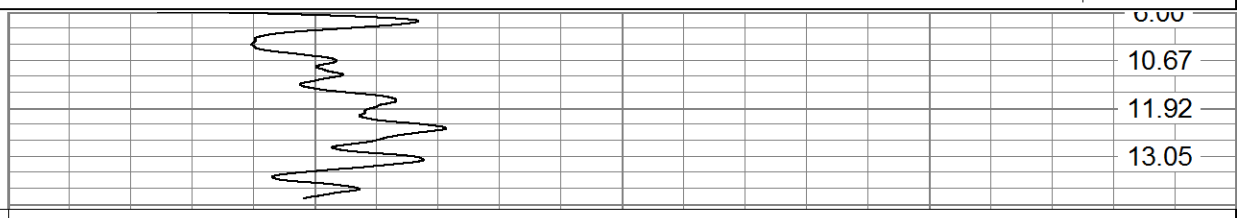
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)
0	250		11.72
60	250		26.78
			28.15
			23.47
120	250		25.47
			25.56
180	250		28.54



Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)

Database File: 15497.db
Dataset Pathname: stop6
Presentation Format: spnstop
Dataset Creation: Mon Sep 27 13:10:20 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

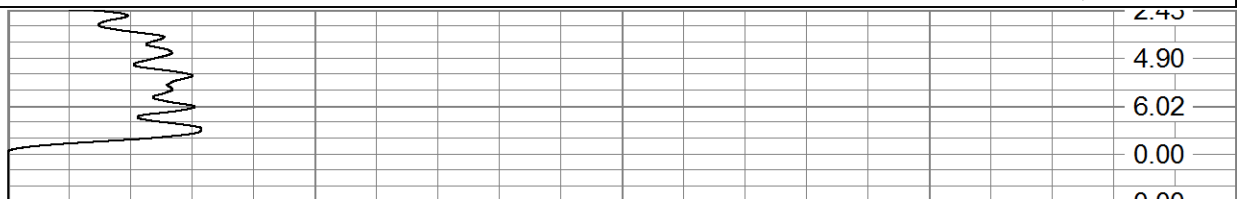
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)
0	270		0.00
			10.67
60	270		11.92
			13.05
120	270		

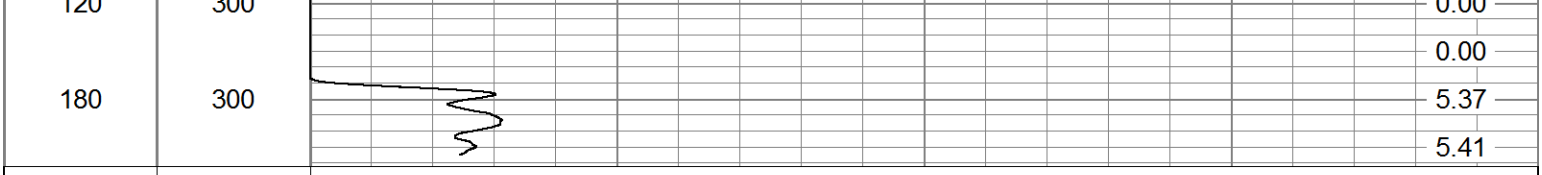


Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)

Database File: 15497.db
Dataset Pathname: stop5
Presentation Format: spnstop
Dataset Creation: Mon Sep 27 13:06:07 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)
0	300		2.43
			4.90
60	300		6.02
			0.00
120	300		0.00

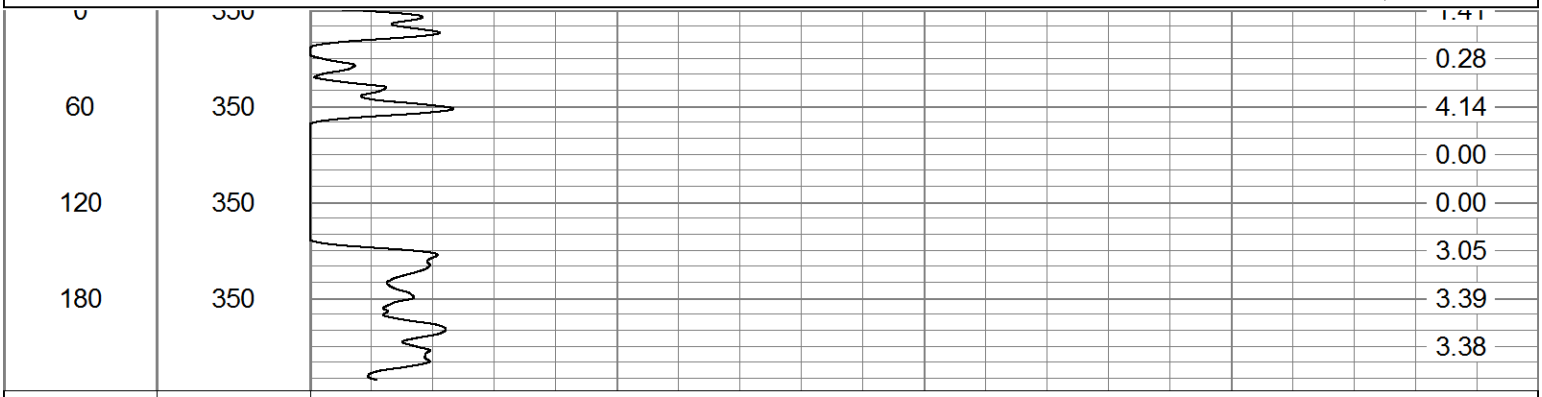




Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)

Database File: 15497.db
Dataset Pathname: stop4
Presentation Format: spnstop
Dataset Creation: Mon Sep 27 13:01:07 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

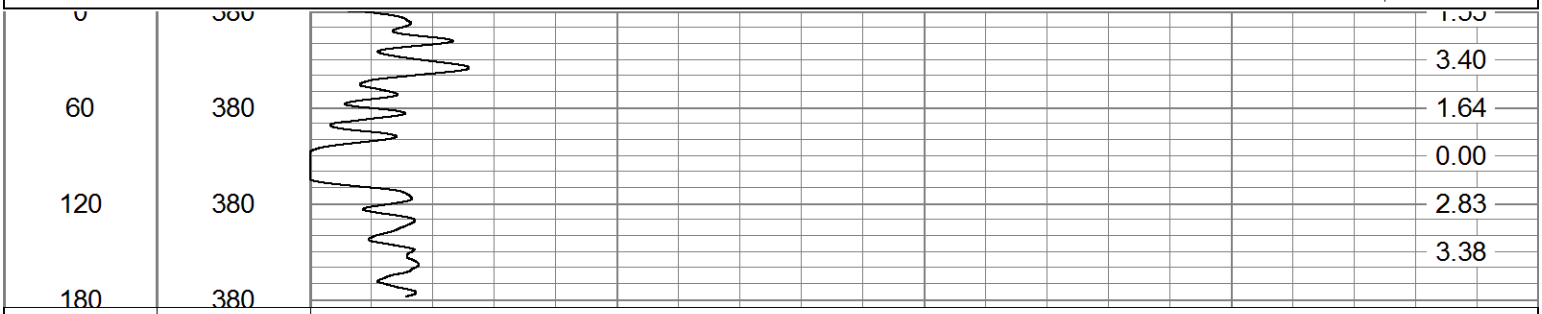
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)



Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)

Database File: 15497.db
Dataset Pathname: stop3
Presentation Format: spnstop
Dataset Creation: Mon Sep 27 12:54:56 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)



Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)

Database File: 15497.db
Dataset Pathname: stop2
Presentation Format: spnstop
Dataset Creation: Mon Sep 27 12:50:38 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)
0	400		0.00
60	400		0.00
120	400		0.00
180	400		0.00

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 40	Spin Stop (cps)

PACIFIC SURVEYS

SPINNER
FLUID VELOCITY
SPINNER ANALYSIS
PUMPING CONDITION

Job No.
15497

File No.

Company LAYNE CHRISTENSEN
Well VENTURA
Field ALTADENA
County LOS ANGELES State CA

Location:

GPS:N34o11'38.2" W118o10'08.3"

Sec. Twp. Rge.

Other Services:

STOP COUNTS
DYNAMIC SPINNER
SAMPLING

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'	K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	9/27/2010
Run Number	ONE
Depth Driller	453'
Depth Logger	453'
Bottom Logged Interval	450'
Top Log Interval	217'
Pump Set @	212'
Time Pumping Prior to Survey	3 HOURS
Pumping Water Level	151'
Max. Recorded Temp.	N/A
Pump Rate (GPM)	1930'
Time Well Ready	11:00 AM
Time Logger on Bottom	11:30 AM
Equipment Number	PS-1
Location	L.A.
Recorded By	ABREAU/AFOH
Witnessed By	PORTER

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	220'	450'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	20"	N/A	0'	453'
Liner				

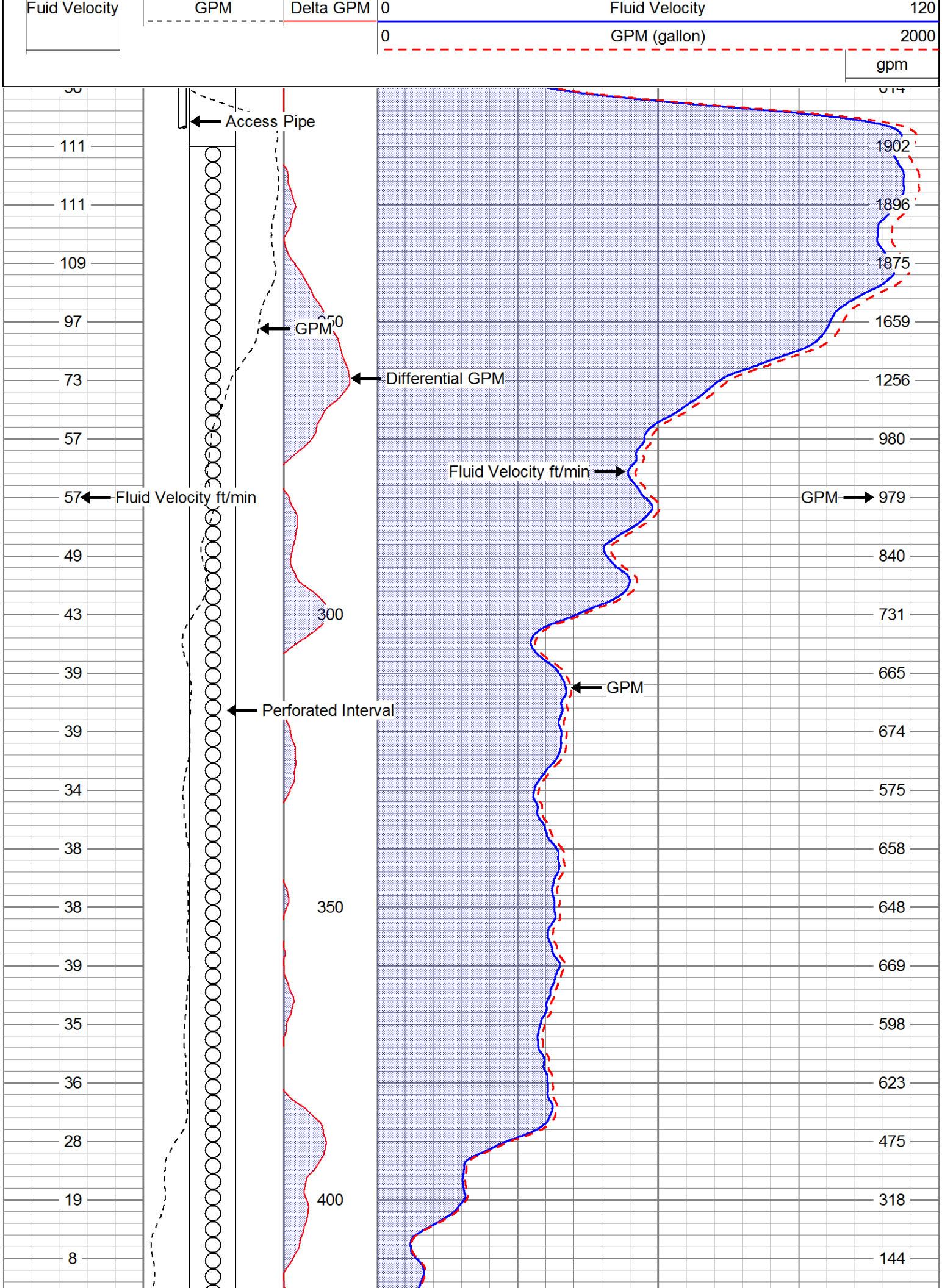
<< Fold Here >>>

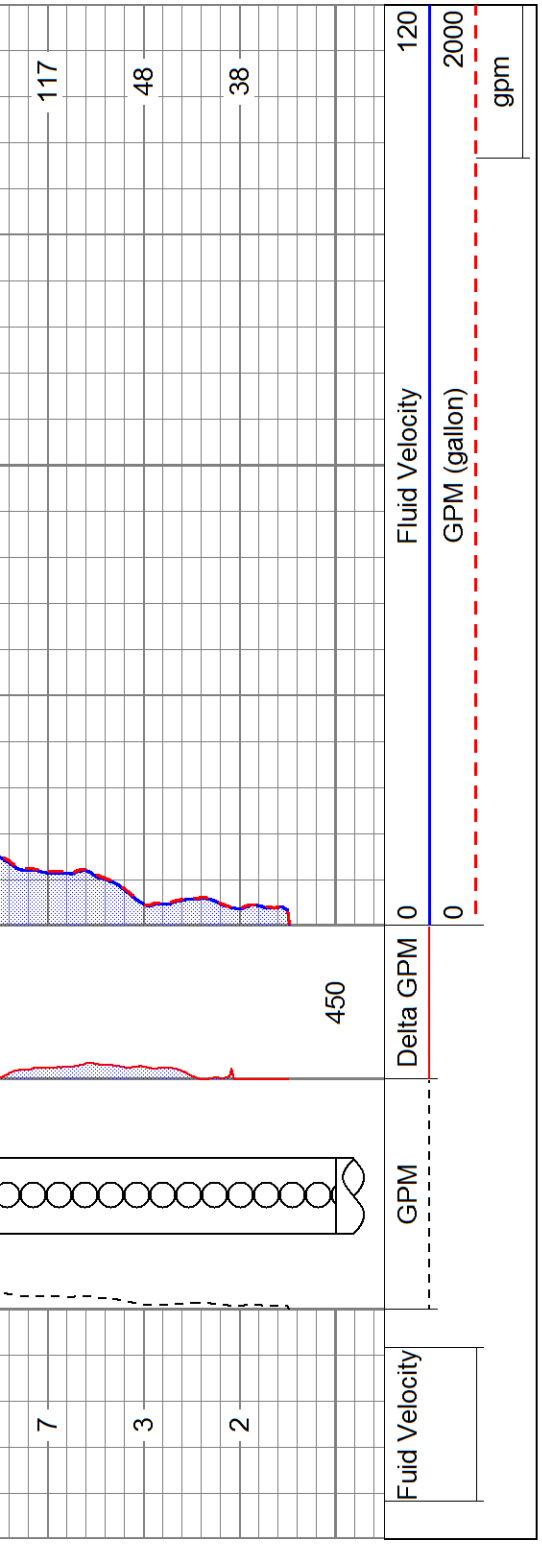
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

Comments

SAMPLES COLLECTED @ 330', 440', 500', 580'

Database File: 15497.db
Dataset Pathname: @007dc328
Presentation Format: spinmerg
Dataset Creation: Tue Oct 05 14:51:27 2010
Charted by: Depth in Feet scaled 1:240


Fuid Velocity
GPM
Delta GPM
0
Fluid Velocity
120
0
GPM (gallon)
2000
gpm
Access Pipe
GPM
Differential GPM
Fluid Velocity ft/min
Fluid Velocity ft/min
GPM
GPM
Perforated Interval
300
350
400
111
111
109
97
73
57
57
49
43
39
39
34
38
38
39
35
36
28
19
8
1902
1896
1875
1659
1256
980
979
840
731
665
674
575
658
648
669
598
623
475
318
144

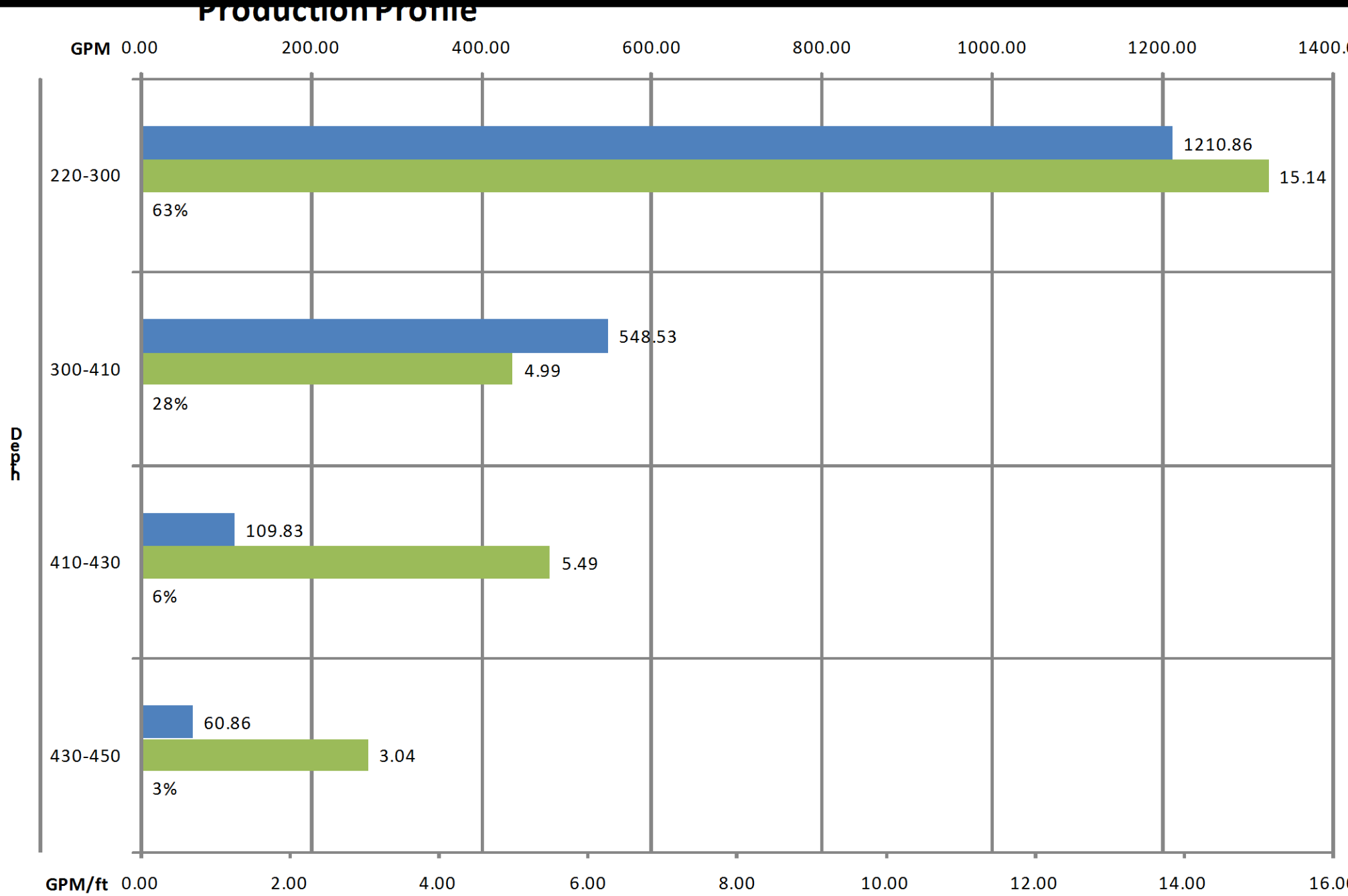


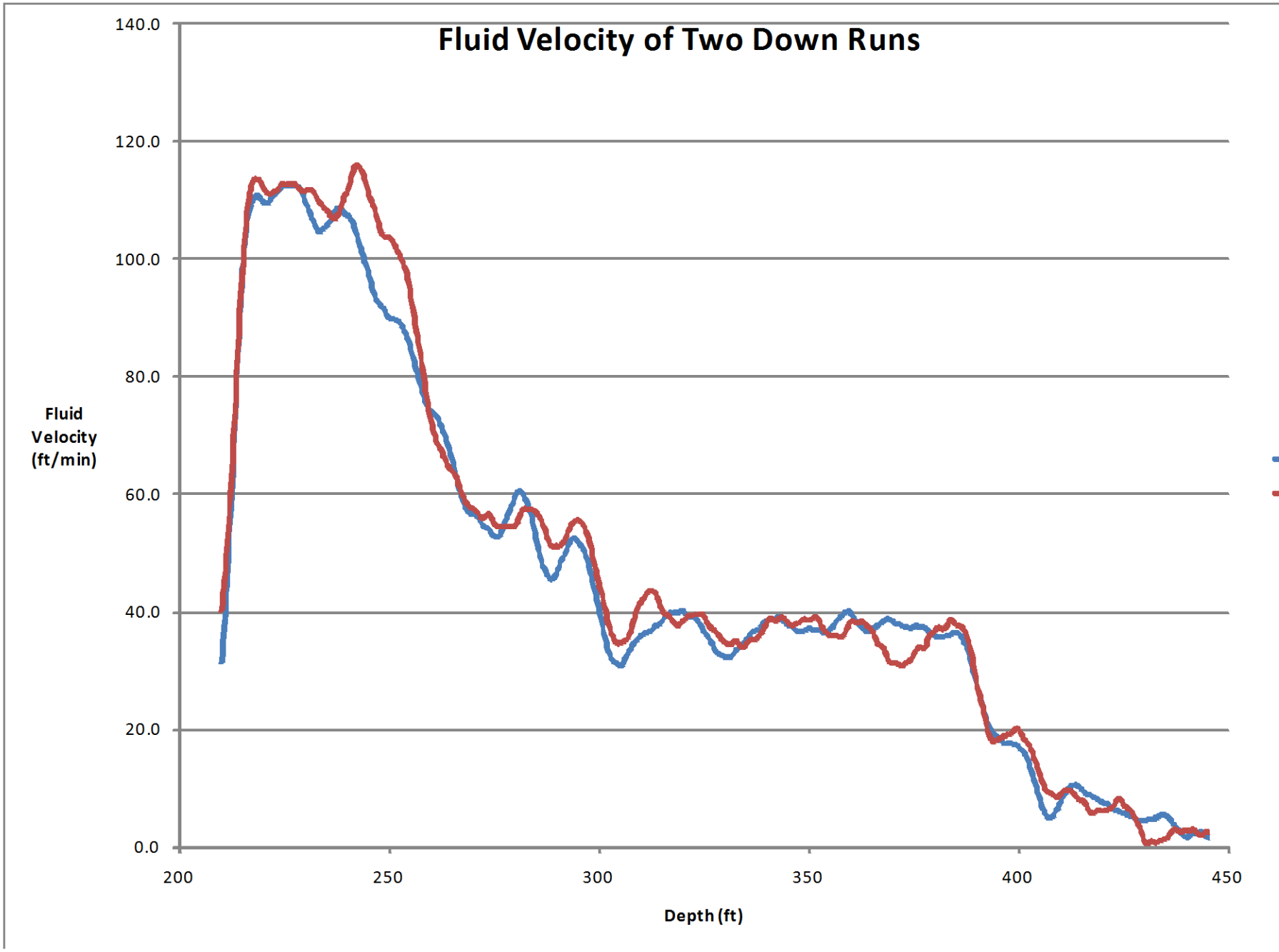
SPINNER LOG ANALYSIS

Pacific Surveys

MAX
FLOW RATE 1930.09 GPM

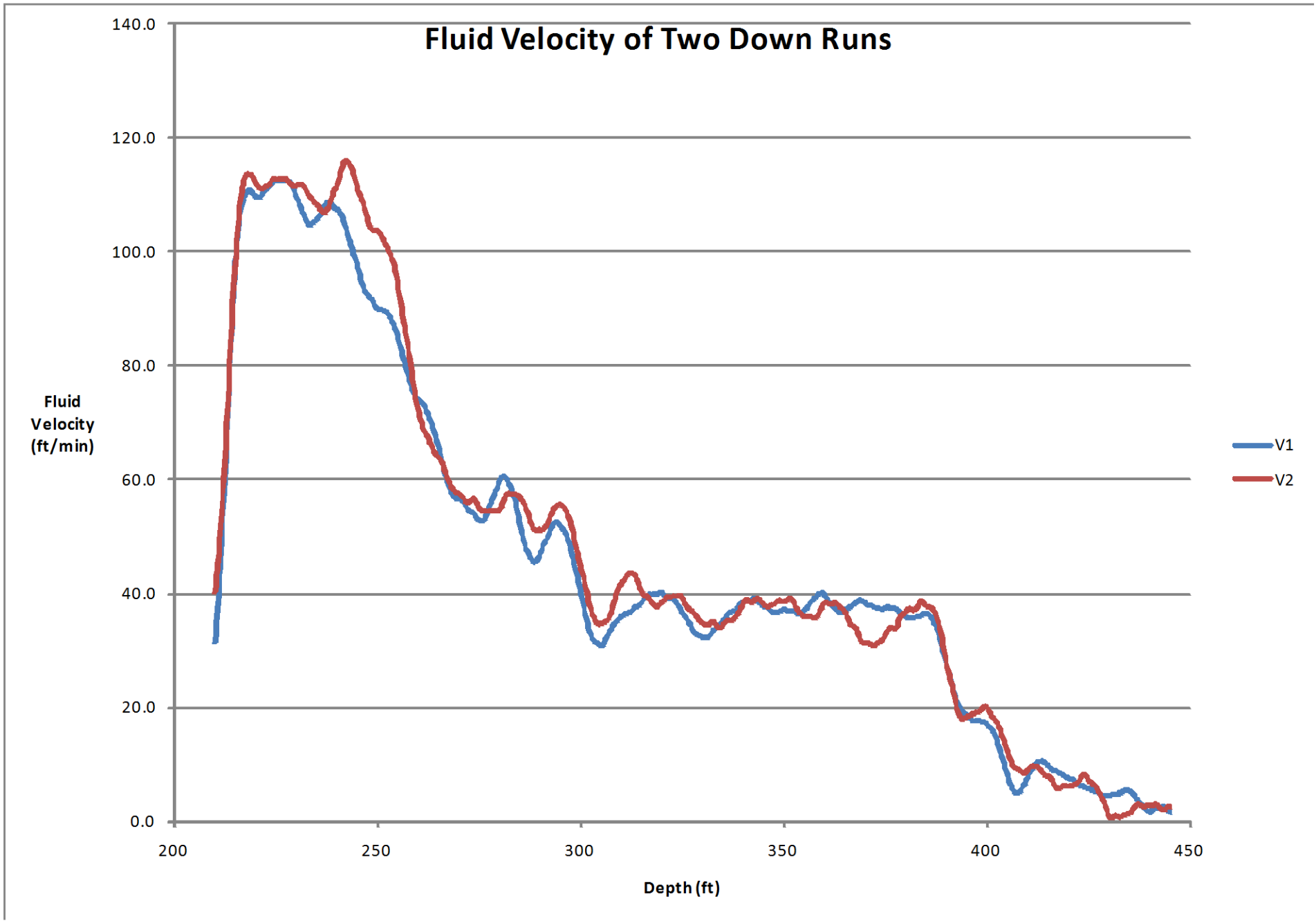
PERFS DEPTHS	PRODUCTION GPM	% OF FLOW ZONES	GPM/FT	THICKNESS ft
220-300	1210.86	63%	15.14	80
300-410	548.53	28%	4.99	110
410-430	109.83	6%	5.49	20
430-450	60.86	3%	3.04	20


Production Profile
GPM
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
1400.
Depth
220-300
1210.86
15.14
63%
300-410
548.53
4.99
28%
410-430
109.83
5.49
6%
430-450
60.86
3.04
3%
GPM/ft
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.0


Fluid Velocity of Two Down Runs
Fluid Velocity (ft/min)
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
200
250
300
350
400
450
Depth (ft)

V1

V2

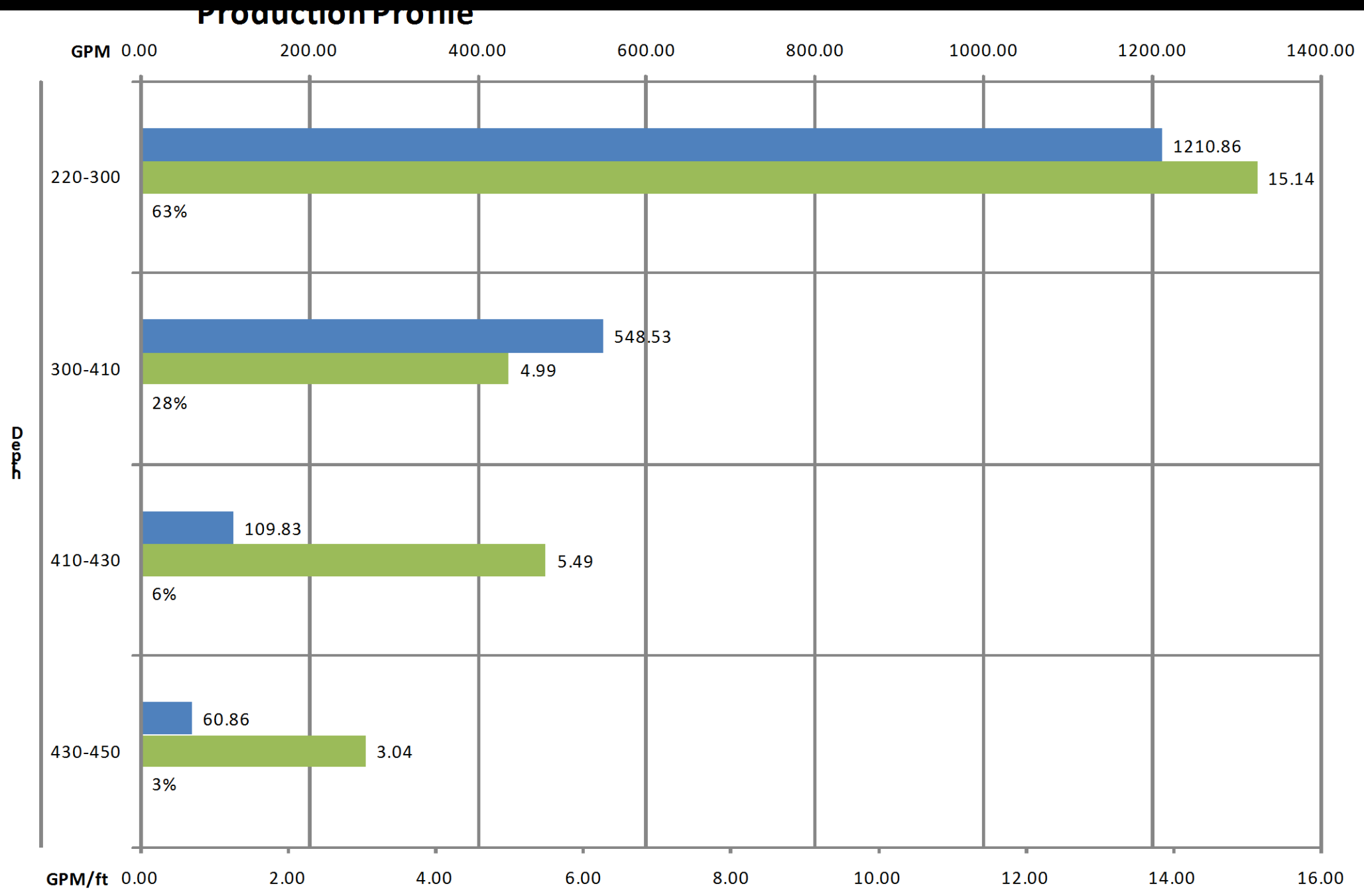

Fluid Velocity of Two Down Runs
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Fluid Velocity (ft/min)
200
250
300
350
400
450
Depth (ft)
V1
V2

SPINNER LOG ANALYSIS

Pacific Surveys

MAX
FLOW RATE 1930.09 GPM

PERFS DEPTHS	PRODUCTION GPM	% OF FLOW ZONES	GPM/FT	THICKNESS ft
220-300	1210.86	63%	15.14	80
300-410	548.53	28%	4.99	110
410-430	109.83	6%	5.49	20
430-450	60.86	3%	3.04	20


Production Profile
GPM
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
1400.00
Depth
220-300
1210.86
15.14
63%
300-410
548.53
4.99
28%
410-430
109.83
5.49
6%
430-450
60.86
3.04
3%
GPM/ft
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00

APPENDIX 2-19: Ventura Well Pump Submittal and Liner Diagram

PASADENA WATER DIVISION
WELL VENTURA NO. 21

Depth to Sand

Date	Depth
11/65	426
11/66	429
3/71	419
7/71	424
12/71	473

Floor Level

473'

PERFORATIONS

FROM	TO
102	141
164	218
241	311
410	468

REMARKS

(1) Casing looks bigger than double 8

WELL

DRILLED BY Roscoe Moss Co.

CONTRACT NO. 1034

DATE 4/25/1924

WORK ORDER 1390

CASING 26 IN NO. 8 (1) GUAGE

STARTER | LENGTH 30' | PLY Double 1/4" | GUAGE

SHOE 26" x 12" x 1 1/2"

ALTERATIONS

PASADENA WATER DEPARTMENT

WELL Ventura NO.

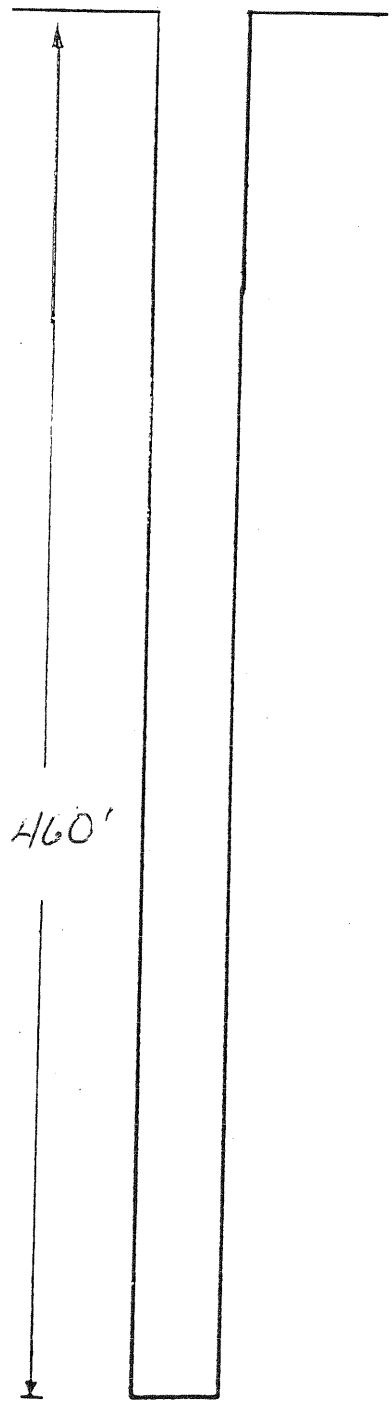
PERFORATIONS

FROM	TO
220	459

.060 SLOT WW Screen
4/1988 GPC

REMARKS

Johnson Well Screen
316SS .060 SLOT



PASADENA WATER DIVISION
WELL VENTURA NO. 21

Depth to Sand

Date	Depth
11/65	426
11/66	429
3/71	419
7/71	424
12/71	473

INSTALLED 1988

Floor Level

220' BLANK LINER

220' of 20" BLANK LINER
20" LINER

473'

240' of JOHNSON SS SCREEN LINER

PERFORATIONS

FROM	TO
102	141
164	218
241	311
410	468

REMARKS
(1) Casing looks bigger than double 8

WELL

DRILLED BY Roscoe Moss Co.

CONTRACT NO. 1034

DATE 4/25/1924

WORK ORDER 1390

CASING 26 IN NO. 8 (1) GUAGE

STARTER | LENGTH 30' | PLY Double 1/4" | GUAGE

SHOE 26" x 18" x 1 1/2"

ALTERATIONS

12/71

ESP Turbine Quotation System 8.0.1.44

Pump Performance Datasheet

Customer	: LAYNE CHRISTENSEN/FONTANA	Quote number	: 139470
Customer reference	:	Item description	: 14RJLC
Item number	: 001	Stages	: 4
Service	: Battelle - Ventura	Based on curve number	: 14RJLC-1770
Quantity	: 1	Date last saved	: 08 Oct 2010 9:46 AM

Operating Conditions

Flow, rated	: 1,600.0 USgpm
Differential head / pressure, rated (requested)	: 242.0 ft
Differential head / pressure, rated (actual)	: 243.5 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Performance

Speed, rated	: 1,770 rpm
Impeller diameter, rated	: 9.13 in
Impeller diameter, maximum	: 9.82 in
Impeller diameter, minimum	: 7.75 in
Efficiency (bowl / pump)	: 83.44 / 76.79 %
NPSH required / margin required	: 17.29 / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 53 / 163 Metric units
MCSF	: 800.0 USgpm
Head, maximum, rated diameter	: 412.0 ft
Head rise to shutoff	: 70.24 %
Flow, best eff. point (BEP)	: 1,533.8 USgpm
Flow ratio (rated / BEP)	: 104.31 %
Diameter ratio (rated / max)	: 92.92 %
Head ratio (rated dia / max dia)	: 81.12 %
Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 0.998 / 0.998 SG
Viscosity, rated	: 1.00 cP
-	:

Material

Material requested	: Auto
Material selected	: CI Bowl (Lined) / Std. Brz Impeller

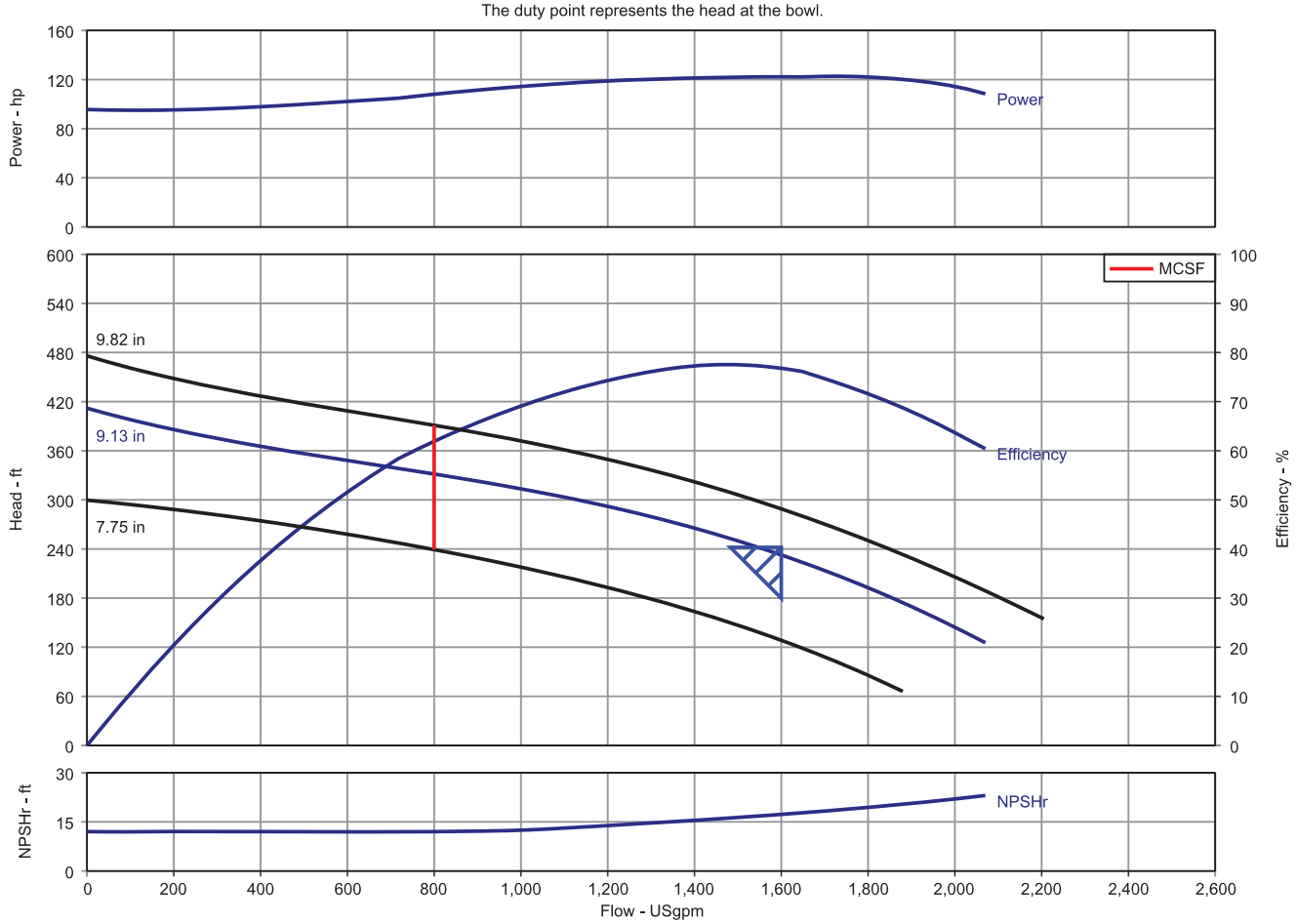
Pressure Data

Maximum working pressure	: 178.3 psi.g
Maximum allowable working pressure	: 420.0 psi.g
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.15
Power, hydraulic	: 97.61 hp
Power (bowl / pump)	: 117 / 122 hp
Power, maximum, rated diameter	: 123 hp
Minimum recommended motor rating	: 125 hp / 93.21 kW

Pump performance. Adjusted for construction, viscosity, static lift to discharge nozzle centerline, friction and power losses of lineshaft and thrust bearings.
The duty point represents the head at the bowl.



Layne Christensen/ Fontana · 11001 Etiwanda Ave · Fontana, CA 92337
phone: 909-390-2833 · fax: 909-390-6097

ESP Turbine Quotation System 8.0.1.44

Pump Performance Datasheet

Customer	: LAYNE CHRISTENSEN/FONTANA	Quote number	: 139470
Customer reference	:	Item description	: 14RJLC
Item number	: 001	Stages	: 4
Service	: Battelle - Ventura	Based on curve number	: 14RJLC-1770
Quantity	: 1	Date last saved	: 08 Oct 2010 10:13 AM

Operating Conditions

Flow, rated	: 1,600.0 USgpm
Differential head / pressure, rated (requested)	: 242.0 ft
Differential head / pressure, rated (actual)	: 243.5 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Performance

Speed, rated	: 1,770 rpm
Impeller diameter, rated	: 9.13 in
Impeller diameter, maximum	: 9.82 in
Impeller diameter, minimum	: 7.75 in
Efficiency (bowl / pump)	: 83.44 / - %
NPSH required / margin required	: 17.29 / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 53 / 163 Metric units
MCSF	: 800.0 USgpm
Head, maximum, rated diameter	: 412.0 ft
Head rise to shutoff	: 70.24 %
Flow, best eff. point (BEP)	: 1,533.8 USgpm
Flow ratio (rated / BEP)	: 104.31 %
Diameter ratio (rated / max)	: 92.92 %
Head ratio (rated dia / max dia)	: 81.12 %
Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 0.998 / 0.998 SG
Viscosity, rated	: 1.00 cP
-	:

Material

Material requested	: Auto
Material selected	: CI Bowl (Lined) / Std. Brz Impeller

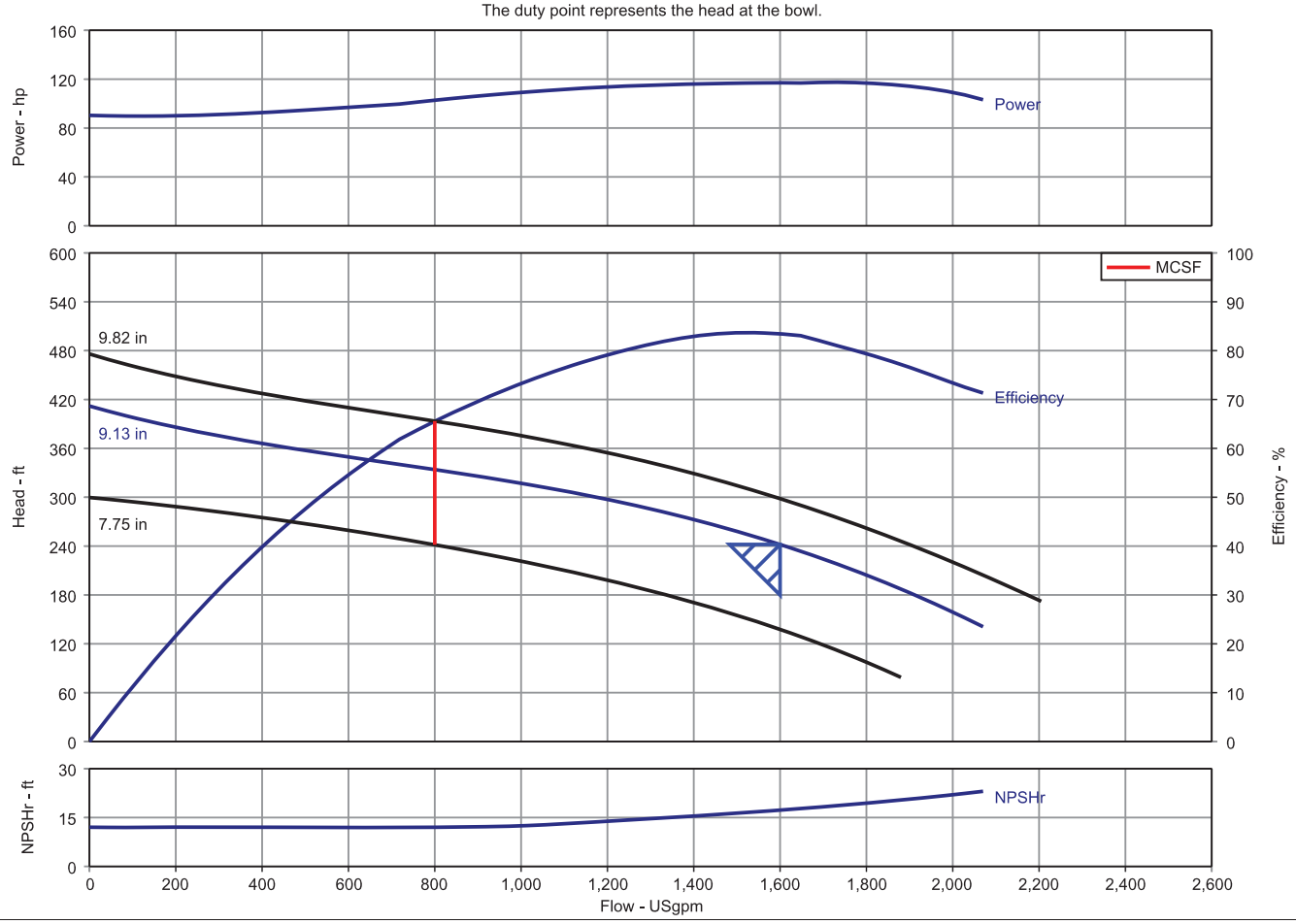
Pressure Data

Maximum working pressure	: 178.3 psi.g
Maximum allowable working pressure	: 420.0 psi.g
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.15
Power, hydraulic	: 97.61 hp
Power (bowl / pump)	: 117 / -
Power, maximum, rated diameter	: 117 hp
Minimum recommended motor rating	: 125 hp / 93.21 kW

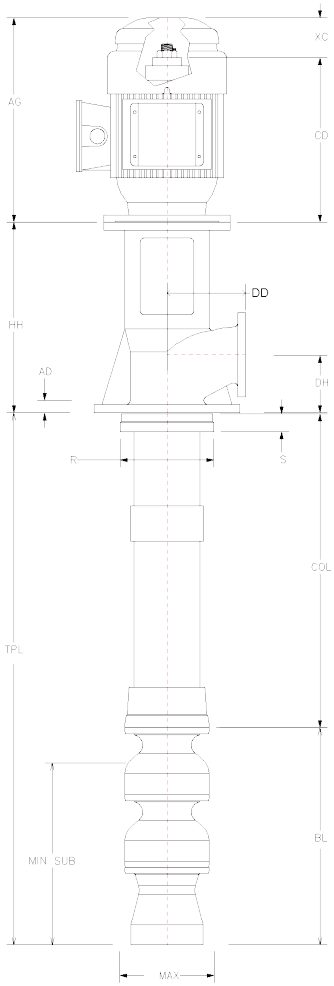
Pump performance. Adjusted for construction, viscosity, static lift to discharge nozzle centerline, friction and power losses of lineshaft and thrust bearings.
The duty point represents the head at the bowl.



Layne Christensen/ Fontana · 11001 Etiwanda Ave · Fontana, CA 92337
phone: 909-390-2833 · fax: 909-390-6097

Dimensional Outline

Customer	: Customer Name	Quote number	: 139470
Customer reference	:	Item description	: 14RJLC
Item number	: 001	Stages	: 4
Service	: Battelle - Ventura	Speed	: 1,770 rpm
Quantity of pumps	: 1	Date last saved	: 08 Oct 2010 10:03 AM

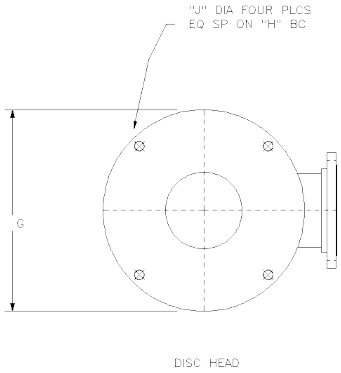


Pump Data

AD	: 1.37 in	Bowl Shaft	: 1.94 in
AG	: 50.06 in		
BD	: 16.50 in	Line Shaft	: 1.50 in
BL	: 59.51 in	Line Shaft Type	: Open
CD	: 44.78 in	Column Type	: Standard
CL	:	Column	: 10 in. Threaded
COL	: 400.1 ft	Bearing Spacing	: 10.00 ft
	:	Section Length	: 10.00 ft
DD	: 14.69 in	Head Type	: F Cast
MIN SUB	: 27.00 in	Head Size	: 10 X 16 1/2 CF
MS	:	Flange Rating	: 250#
DH	: 10.56 in		
G	: 25.00 in	Seal	: Packing
H	: 22.75 in	Strainer	: None
HH	: 28.25 in	SubBase	: No
J	: 0.75 in		
R	: 14.60 in		
S	: 2.38 in		
	:		
TPL	: 405.1 ft		
UG	:		
V	:		
W	:		
X	:		
XC	: 0.00 in		
Y	:		
Z	:		
	:		
Max Allowable Shaft Elongation	:		
Total Shaft Elongation	: 0.23 in		
MAX	: 13.62 in		

Hydraulic Data

Flow	: 1,600.0 USgpm
TDH (total dynamic head)	: 232.7 ft
	:
Speed	: 1,770 rpm
Fluid	: Fresh Water
Temperature	: 68.00 deg F
Viscosity	: 1.00 cP
Density	: 0.998 SG
SU	: 0.00 in
	:
	:
M (TPI)	: 0
L	: 1.50 in



Motor is RUSI (premium efficient) with Thermostats

Miscellanious

Thrust at Design	: 4,898.8 lbf
Max Thrust	: 6,595.8 lbf
	:

Weight

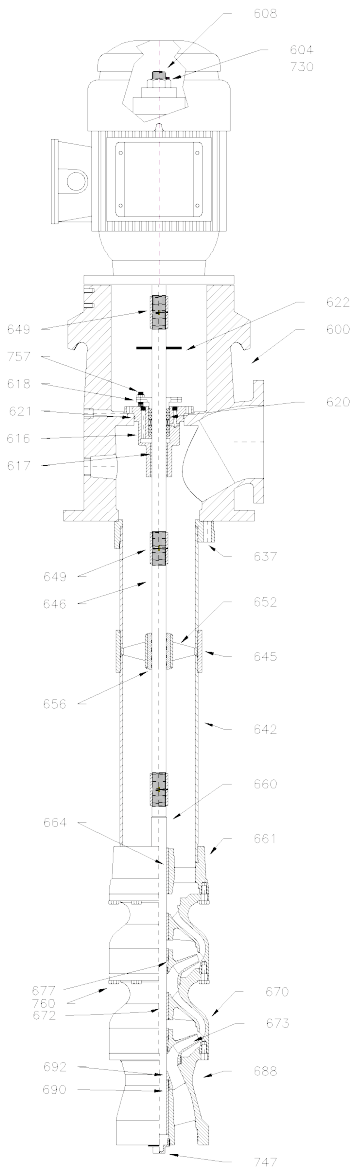
Pump	: 18,795.2 lb
Motor	: 1,500.0 lb
Total	: 20,295.2 lb

Motor Data

Model	: HO150V2SLG
Make	: US Motors
HP	: 150
"Nominal" RPM	: 1800
ITT Item No.	: N/A
"Nominal" Efficiency	: 96.2
Frame	: H444TP
Ratchet	: NRR

Sectional Drawing

Customer	: Customer Name	Quote number	: 139470
Customer reference	:	Item description	: 14RJLC
Item number	: 001	Stages	: 4
Service	: Battelle - Ventura	Speed	: 1,770 rpm
Quantity of pumps	: 1	Date last saved	: 08 Oct 2010 10:03 AM



Discharge Head Assembly				
ITEM	NAME	CODE	MATERIAL	ASTM
600	Head- Discharge	1003	Cast Iron CL30	A48-94ae1
604	Adjusting Nut	2130	Brass C36000	B16M-00
608	Headshaft	2227	SST 416	A582M-95b
616	Housing	1003	Cast Iron CL30	A48-94ae1
617	Housing bearing	1109	Federalloy Bismuth Bronze	B584-00
618	Split Gland	1203	SST 316	A744M-00
620	Packing	5026	Graphite Packing	ML402-99
621	O-Ring	5302	Nitrile Buna N	D4322-96
637	Top Column Flange	1003	Cast Iron CL30	A48-94ae1
639	Column Lock Ring	1018	Cast Iron CL30	A48-94ae1
649	Lineshaft Coupling	2265	416 SS	A582M-95b
757	Screw- Gland Adjusting	2229	SST 316	A276-00a
779	Gasket- Housing	5136	Acrylic/Nitrile	5136 REV 4

Column And Lineshaft Assembly				
ITEM	NAME	CODE	MATERIAL	ASTM
642	Column Pipe	6501	Black Pipe	A 53-98
645	COLUMN FASTENER	Ductile iron combo coupling		
646	Lineshaft	2227	416 SS	A582M-95b
649	Lineshaft Coupling	2265	416 SS	A582M-95b
652	Retainer- Bearing	Ductile iron		
656	Lineshaft Bearing	5121	Rubber EPDM	D3568-98

Bowl Assembly				
ITEM	NAME	CODE	MATERIAL	ASTM
660	Bowl Shaft	2227	416 SS	A582M-95b
661	Bowl- Discharge	1003	Cast Iron CL30	A48-94ae1
664	Bearing- Disc Bowl	1109	Federalloy Bismuth Bronze	B584-00
670	Bowl - Intermediate	6911	Cast Iron 30 Lined	A48-94e1
672	Bearing- Int. Bowl	1109	Federalloy Bismuth Bronze	B584-00
673	IMPELLER	1102	Silicon Bronze	B584-00
677	Collet	2217	CARBON STEEL 1018	A108-99
688	Bowl/Bell- Suction	1003	Cast Iron CL30	A48-94ae1
690	Bearing- Suction	1109	Federalloy Bismuth Bronze	B584-00
692	Sandcollar	1205	304 SST	A744M-00
747	Suction Plug	1046	Malleable Iron	A197
760	CAP SCREW	2298	Grade 8 Steel	J429-99

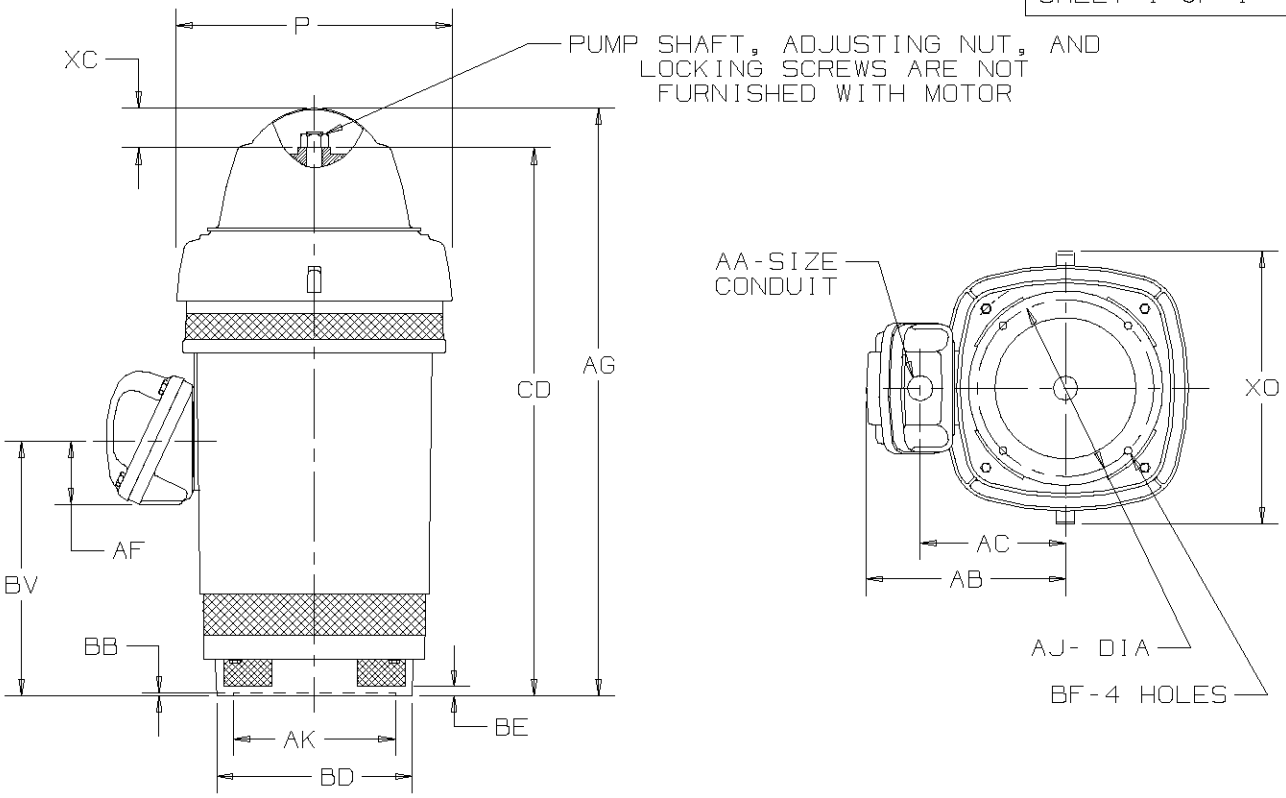
BATTELLE-VENTURA

150 HP VERTICAL
RUSI-PREM. EFFICIENT

VERTICAL MOTORS

WEATHER PROTECTED TYPE I
FRAME: 444,445TP,TPA
TYPE: RU,RUE,RUI,RUS

PRINT: 09-2294
EFFECTIVE: 28-AUG-01
SUPERSEDES: NEW



Battelle - Ventura 150 hp

ALL DIMENSIONS ARE IN INCHES & MILLIMETERS

BASIC FRAME	UNITS	P [2]	AG	BE	BV	CD	XC	XO
440	IN	22.88	47.81	.75	21.16	42.66	5.13	25.88
	mm	581	1214	19	537	1084	130	657

FRAME	CONDUIT BOX MATERIAL	UNITS	AA	AB	AC	AF
440	STEEL	IN	3.00	18.94	14.44	4.72
		mm	76	481	367	120
	CAST IRON	IN	3-1/2 NPT	18.56	14.31	5.28
		mm		471	363	134

FRAME	UNITS	AJ	AK +.005	BB MIN	BD MAX	BF
444,445TP	IN	14.750	13.500	.25	16.50	.69
	mm	374.65	342.90	6	419	18
444,445TPA	IN	14.750	13.500	.25	20.00	.69
	mm	374.65	342.90	6	508	18

TOLERANCES	
FACE RUNOUT	.007 F.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.007 F.I.R.

1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING VARIATIONS.
2: LARGEST MOTOR WIDTH.
3: CONDUIT BOX OPENING MAY BE LOCATED IN STEPS OF 90° REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
4: TOLERANCES SHOWN ARE IN INCHES ONLY.

U.S. ELECTRICAL MOTORS
DIVISION OF EMERSON ELECTRIC CO.
EMERSON
DO NOT USE FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED

General Information

Typical Motor Construction Features

FRAME MATERIAL:

NEMA®† FRAMES (180 thru 447)

Type:	AV, AU, AUE, AUI	Aluminum
	RV, RU, RUE, RUEI, RUSI	Cast Iron
	TV, TU	Aluminum (180-280 Frames)
		Cast Iron (320-440 Frames)

TITAN® FRAMES (5008)

Type:	RU, RUEI	Cast Iron

BRACKETS:

NEMA®† FRAMES

Both end brackets are cast iron except for the following:
Type AV: Upper bracket on 180 & 210 frames is aluminum.
Type TV: Upper bracket on 180-280 frames is aluminum.
Type TU: Upper bracket on 250 & 280 frames is aluminum.

TITAN® FRAMES (5008)

Cast iron.

CANOPY CAP: Constructed of plastic, steel, aluminum, fiberglass or cast iron depending on exact frame and type.

FAN COVER (TEFC): Constructed of plastic, steel, aluminum or cast iron depending on exact frame and type.

BEARING CAPS: All Vertical motors are furnished with lower bearing caps constructed of aluminum or cast iron.

STANDARD ROTATION: Counter Clockwise (CCW) viewed from top of the motor.

BEARING LUBRICATION

Frame	Type	Upper Bearing	Lower Bearing	Thrust Capacity
180-280	AUC, AUE, AU, AUI, AUR	Grease	Grease**	High
180-440	AV, TV	Grease	Grease**	Normal
320-447	RV	Grease	Grease**	Normal
	RU, RUE, RUSI	Oil	Grease	High
180-360	TU	Grease	Grease**	High
400-440		Oil	Grease	High
5000	RU, RUS, RUEI	Oil	Grease	High

**Lower bearing is thrust bearing. † All non-Emerson Electric Co. marks shown within this document are properties of their other respective owners.

OPERATING CHARACTERISTICS – VERTICAL HOLLOSHAFT® MOTORS
HIGH THRUST - "P" BASE, THREE PHASE, WEATHER PROTECTED TYPE I (WPI)
PREMIUM EFFICIENT AND PREMIUM EFFICIENT/INVERTER DUTY

PERF DATA
VHS
WPI
PRE EFF

HP	RPM		% EFFICIENCY			% POWER FACTOR			CURRENT (AMPS) 460 VOLTS		TORQUE AT FULL VOLTAGE (FT./LBS.)			NEMA CODE
											FULL LOAD TORQUE @	LOCKED (STARTING)	PULLOUT BREAKDOWN	
	NO LOAD	FULL LOAD	FULL LOAD	3/4 LOAD	1/2 LOAD	FULL LOAD	3/4 LOAD	1/2 LOAD	FULL LOAD	LOCKED STARTING	FULL LOAD SPEED	% OF FULL LOAD		
15	1800	1770	91.7	92.4	92	83.4	80.5	72.6	18.4	108	44.5	227	240	G
20	1800	1770	92.4	93.3	93.3	85.4	84	78.6	23.7	136	59.4	222	223	G
25	1800	1765	92.4	93.5	93.5	84.6	82.7	76.5	30	173	74.3	230	230	G
30	1800	1770	92.4	93.8	93.9	84.5	82.8	76.8	36	201	89.1	224	222	G
40	1800	1780	94.1	94.4	93.6	87.8	86.4	81.3	45	286	117.9	192	251	G
50	1800	1780	94.5	94.6	94.1	87.7	86.2	80.9	56	358	147.5	192	252	G
60	1800	1785	94.5	95.2	94.8	87.2	85.9	80.9	68	434	176.7	200	237	G
75	1800	1780	95	95.3	95.1	85.3	82.9	75.8	87	539	221.1	200	247	G
100	1800	1785	95.4	95.5	95.1	86.3	84.5	78.4	114	737.5	294.3	185	230	G
125	1800	1785	95.4	95.6	95.3	86.4	85.2	79.7	142	924.1	368.1	186	230	G
150	1800	1785	95.8	96.1	95.6	86.3	83.9	77.1	169	1072.2	441.5	174	235	G
200	1800	1785	95.8	96.2	95.8	85.4	82.4	74.6	228	1484.2	588.9	186	244	G
250	1800	1780	95.8	96	95.6	83.9	80.4	71.8	292	1794.3	737.1	183	235	G
300	1800	1785	95.8	96.2	96	88.6	88.1	84.4	331	2200	883.1	80	175	G
350	1800	1785	95.8	96.5	96.5	87.9	87.2	83.2	389	2550	1031.2	80	175	G
400	1800	1780	95.8	96.3	96.2	86.5	85	79.5	452	2900	1179	80	175	G
450	1800	1785	96.2	96.6	96.3	89.1	88.5	85	491	3250	1323.3	80	175	G

Battelle - Ventura

US motors 150 ho premium efficiency vertical hollowshaft motor with 120 volt space heaters and thermostats

Efficiency and power factor values listed above are typical values. For guaranteed and certified values, refer to the Technical Service Group.
The code letter is an indication of the locked rotor K.V.A. in accordance with the National Electrical Code.
When performance values have been quoted, they should be shown on the order.
Data subject to change without notice.

APPENDIX 2-2: Summary Video Log Inspection Sheets for Windsor Well

Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle,City of Pasadena
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena.Ca.
GPS LOCATION: Latitude: N ° Longitude: W °

WELL NUMBER: Windsor **JOB NUMBER:** 1000-1221

SURVEYED BY: Tim Narwold **DATE:** 21-Jul-09

REVIEWED BY: **WATER LEVEL:** 162'11"

WATER CONDITION: Cloudy/Clear **TOTAL DEPTH:** 600'

CASING DIAMETER: 20.5"ID **SURVEY DEPTH:** 544'11"

*All Depths Shown are relative to the center of the side camera perspective.

Not correct

DEPTH	REMARKS
0-280'	Casing appears to have mild scale and growth.
281'	Air line in well,Large bunch at 390'
280-400'	Casing appears to have moderate scale and growth.
400-544'10"	Casing appears to have heavy scale and growth.
544'10"	Camera light bar enters fill and will not pass.

Perforation:	
Vertical	300-320'
Mills Slot	
Horizontal	320-344'
Mills Nife	374-384'
	426-450'
	474-485'
	497-585'

Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle-JPL Pasadena
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena.Ca.
GPS LOCATION: Latitude: N 34° 11' 30.0" | Longitude: W 118° 10' 02.8"

WELL NUMBER: Windsor **JOB NUMBER:** 27-1221
SURVEYED BY: Tom Schuldheisz **DATE:** 5-Aug-09
REVIEWED BY: **WATER LEVEL:** 164' 01"
WATER CONDITION: Cloudy/Clear **TOTAL DEPTH:** Unknown
CASING DIAMETER: 20.50"ID **SURVEY DEPTH:** 540'

*All Depths Shown are relative to the center of the side camera perspective.

Not correct

DEPTH	REMARKS
0 - 164'	Casing appears to have mild scale and growth.
164' 01"	Camera enters static water level.
164' - 255'	Casing appears to have mild scale and growth.
255' - 258'	Casing appears to have a seam.
258' - 300'	Casing appears to have moderate scale and growth.
300' - 540'	Casing appears to have mild scale and growth.
444' - 540'	Possible drop tube In well.
540'	Camera comes to rest at the fill.

Perforation:	
Vertical	300-320'
Mills Slot	
Horizontal	320-344'
Mills Knife	374-384'
	426-450'
	474-485'
	497-585'

Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle-JPL Pasadena
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: 2696 Windsor Ave. Alta Dena
GPS LOCATION: Latitude: N 34° 11' 30.0" | Longitude: W 118° 10' 02.8"

WELL NUMBER: Windsor **After Rehab** **JOB NUMBER:** 1000-1968

SURVEYED BY: Jeff Conner **DATE:** 24-Mar-10

REVIEWED BY: **WATER LEVEL:** 140' 10"

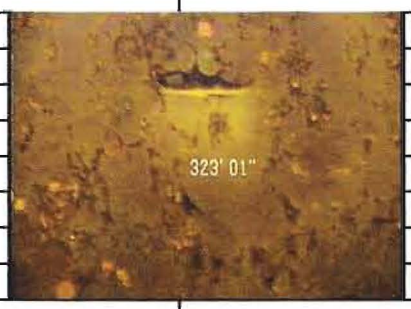
WATER CONDITION: Cloudy **TOTAL DEPTH:** 600'

CASING DIAMETER: 20.50" ID **SURVEY DEPTH:** 595' 2"

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
6"	Access port enters casing.
0 - 140'	Casing appears to have mild scale.
140' 10"	Camera enters static water level.
140 - 380'	Casing appears to have mild scale and growth.
380 - 595'	Camera experiences very poor visibility.
526 - 595'	Air line in casing.
595' 2"	Camera comes to rest at top of fill.

Perforations:	
Hydraulic Louver	322 - 346'
	376 - 385'
	427 - 452'
	477 - 487'
	500 - 587'



Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle-JPL Pasadena
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: 2696 Windsor Ave. Alta Dena
GPS LOCATION: Latitude: N 34° 11' 30.0" | Longitude: W 118° 10' 02.8"

WELL NUMBER: Windsor **After Rehab** **JOB NUMBER:** 1000-1968

SURVEYED BY: Daniel De La Rosa **DATE:** 30-Mar-10

REVIEWED BY: Jeff Conner **WATER LEVEL:** 139' 4"

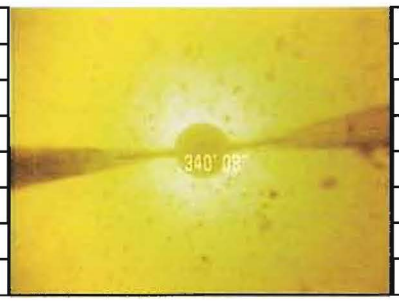
WATER CONDITION: Cloudy **TOTAL DEPTH:** 600'

CASING DIAMETER: 20.50" ID **SURVEY DEPTH:** 594'

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
6"	Access port enters casing.
0 - 139'	Casing appears to have mild scale.
139' 04"	Camera enters static water level.
139 - 594'	Camera experiences very poor visibility.
594'	Camera comes to rest at top of fill.

Perforations:	
Hydraulic Louver	322 - 346'
	376 - 385'
	427 - 452'
	477 - 487'
	500 - 587'



Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: 2696 Windsor Ave. Alta Dena
GPS LOCATION: Latitude: N 34° 11' 30.0" | Longitude: W 118° 10' 02.8"

WELL NUMBER: Windsor **After Liner** **JOB NUMBER:** 1000-1968

SURVEYED BY: Jeff Conner **DATE:** 15-Sep-10

REVIEWED BY: **WATER LEVEL:** 153' 6"

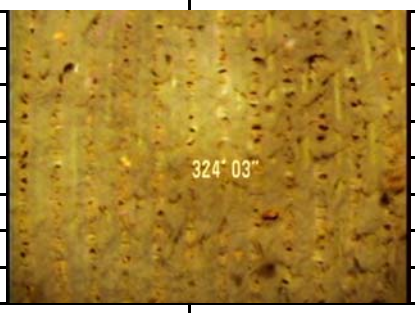
WATER CONDITION: Cloudy/Clear **TOTAL DEPTH:** 600'

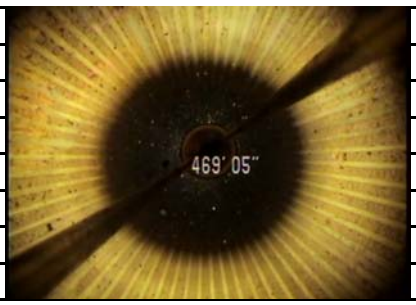
CASING DIAMETER: 14" **SURVEY DEPTH:** 588'

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
0 - 100'	Confirmed calibration.
100 - 153'	Casing appears to have very mild growth.
153' 6"	Camera enters static water level.
153 - 320'	Camera experiences very poor visibility. Casing appears to have mild growth.
317'	Di-electric coupling.
320 - 500'	Casing appears to have mild soft growth on screen.
500 - 575'	Casing appears to have mild settled fines on screen.
575 - 588'	Casing appears to have mild dark growth.
588'	Camera enters fill to side perspective, and video is stopped.

Perforations:	
Stainless Steel Wire Wrap	332 - 588'





Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: 2696 Windsor Ave. Alta Dena
GPS LOCATION: Latitude: N 34° 11' 30.0" | Longitude: W 118° 10' 02.8"

WELL NUMBER: Windsor **JOB NUMBER:** 1000-1968

SURVEYED BY: Jeff Conner **DATE:** 30-Nov-10

REVIEWED BY: **WATER LEVEL:** 145'

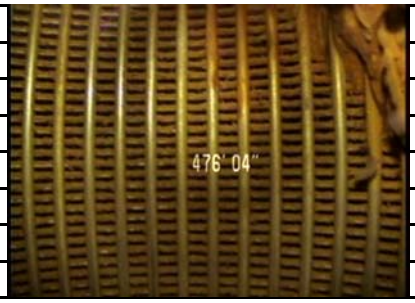
WATER CONDITION: Cloudy/Clear **TOTAL DEPTH:** 600'

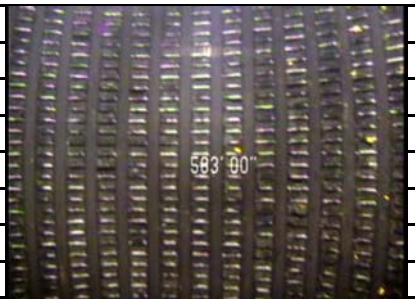
CASING DIAMETER: 14" **SURVEY DEPTH:** 589' 5"

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
1' 2"	Access port enters casing.
1' 9"	Liner begins.
1 - 145'	Casing appears to have mild scale and growth.
145'	Camera enters static water level.
145 - 240'	Casing appears to have mild growth.
240 - 360'	Casing appears to have increased growth.
318' 11"	Di-electric coupling.
360 - 375'	Casing appears to have moderate growth.
375 - 589'	Casing appears to have heavy growth.
589' 5"	Camera enters fill to side perspective, and video is stopped.

Perforations:	
Stainless Steel Wire Wrap	324 - 592'





Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

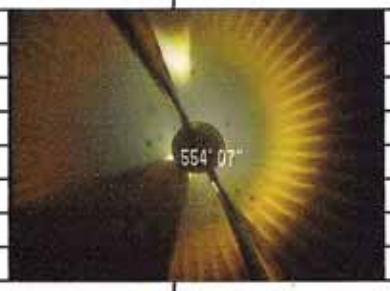
Well Inspection Report

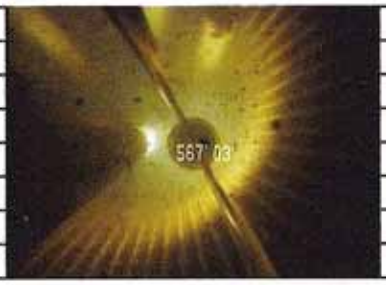
CLIENT: Battelle
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: 2696 Windsor Ave. Alta Dena
GPS LOCATION: Latitude: N 34° 11' 30.0" | Longitude: W 118° 10' 02.8"

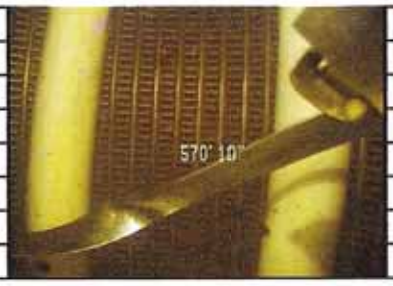
WELL NUMBER: Windsor **JOB NUMBER:** 1000-1968
SURVEYED BY: Jeff Conner **DATE:** 3-Jan-11
REVIEWED BY: **WATER LEVEL:** 134' 3"
WATER CONDITION: Cloudy/Clear **TOTAL DEPTH:** 600'
CASING DIAMETER: 14" **SURVEY DEPTH:** 575' 10"

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS		
1' 2"	Access port enters casing.	**Perforations:**	
1' 9"	Liner begins.		
5 - 134'	Casing appears to have mild scale and growth.	**Stainless Steel**	324 - 592'
134' 3"	Camera enters static water level.	**Wire Wrap**	
134 - 324'	Casing appears to have mild growth.		
318' 11"	Di-electric coupling.		
234 - 575'	Casing appears to have mild scaling.		
508' 2"	1 3/4" PVC		
529'	1 3/4" PVC		
539' 6"	1 3/4" PVC		
559' 5"	1 3/4" PVC		
568' 6"	1 3/4" PVC		
570' 10"	Stainless steel band.		
575' 10"	Camera light bulb comes to rest at fill.		







Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: 2696 Windsor Ave. Alta Dena
GPS LOCATION: Latitude: N 34° 11' 30.0" | Longitude: W 118° 10' 02.8"

WELL NUMBER: Windsor **JOB NUMBER:** 1000-1968

SURVEYED BY: Jeff Conner **DATE:** 14-Jan-11

REVIEWED BY: **WATER LEVEL:** 149' 11"

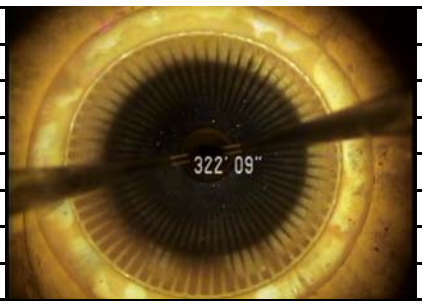
WATER CONDITION: Clear **TOTAL DEPTH:** 600'

CASING DIAMETER: 13.75" ID **SURVEY DEPTH:** 561' 9"

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
1' 2"	Access port enters casing.
1' 9"	Liner begins.
0 - 149'	Casing appears to have mild scale and growth.
149' 11"	Camera enters static water level.
134 - 561'	Casing appears to have mild growth.
280' 8"	Hole in casing.
318' 11"	Di-electric coupling.
561' 9"	Camera comes to rest at fill.

Perforations:	
Stainless Steel Wire Wrap	324 - 592'



Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: 2696 Windsor Ave. Alta Dena
GPS LOCATION: Latitude: N 34° 11' 30.0" | Longitude: W 118° 10' 02.8"

WELL NUMBER: Windsor **After Patch** **JOB NUMBER:** 1000-1968

SURVEYED BY: Jeff Conner **DATE:** 17-Jan-11

REVIEWED BY: **WATER LEVEL:** 143'

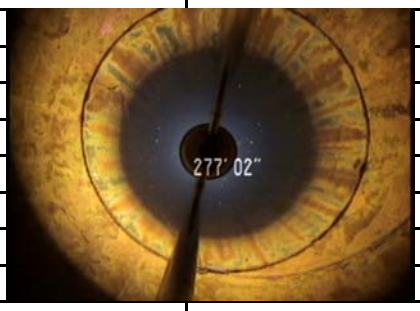
WATER CONDITION: Clear **TOTAL DEPTH:** 600'

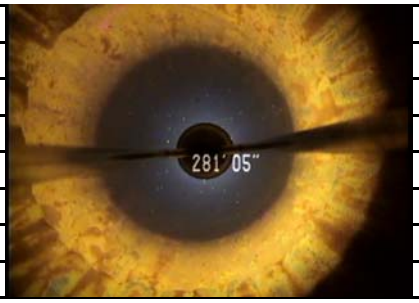
CASING DIAMETER: 13.75" ID **SURVEY DEPTH:** 561' 10"

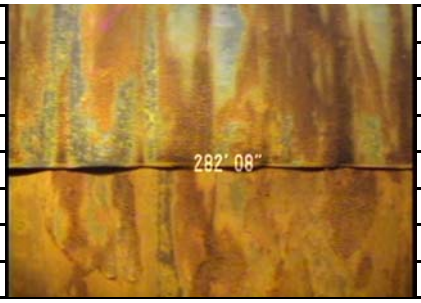
*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
1' 2"	Access port enters casing.
1' 9"	Liner begins.
5 - 143'	Casing appears to have mild scale and growth.
143'	Camera enters static water level.
134 - 561'	Casing appears to have mild growth.
278' 7" - 282' 8"	Patch in casing.
318' 11"	Di-electric coupling.
561' 10"	Camera comes to rest at fill.

Perforations:	
Stainless Steel Wire Wrap	324 - 592'







Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: 2696 Windsor Ave. Alta Dena
GPS LOCATION: Latitude: N 34° 11' 30.0" Longitude: W 118° 10' 02.8"

WELL NUMBER: Windsor **Hole in Patch** **JOB NUMBER:** 1000-1968

SURVEYED BY: Jeff Conner **DATE:** 12-Feb-11

REVIEWED BY: **WATER LEVEL:** 130' 10"

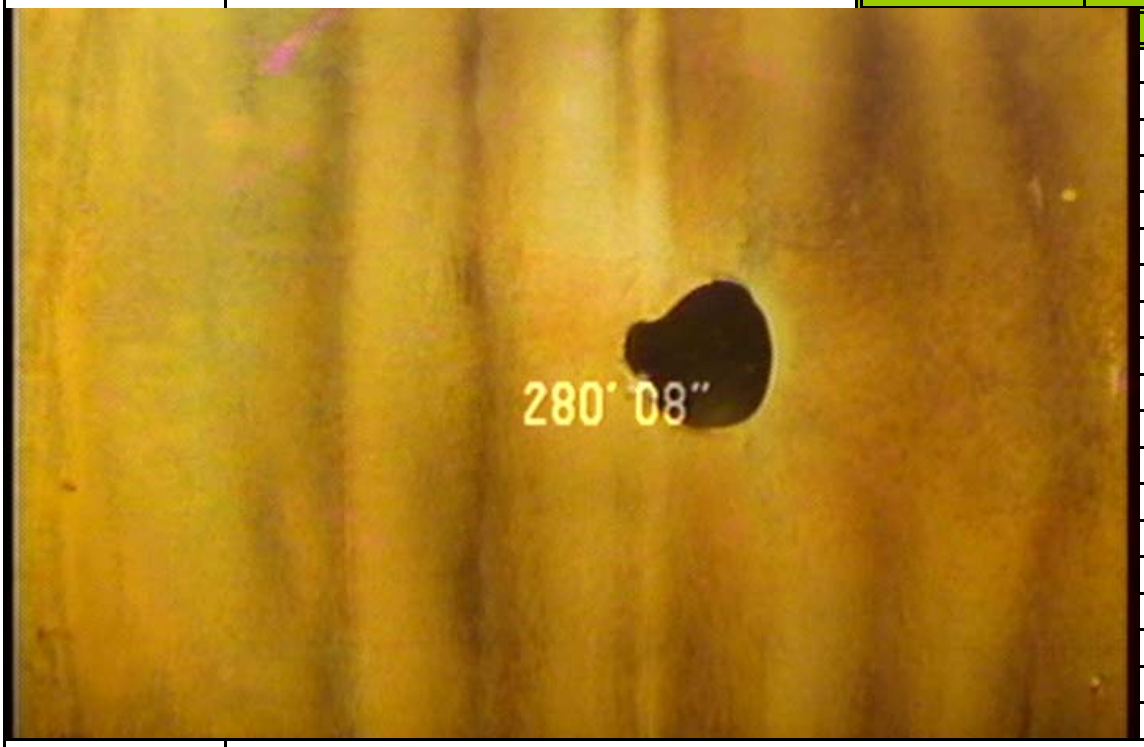
WATER CONDITION: Clear **TOTAL DEPTH:** 600'

CASING DIAMETER: 13.75" ID **SURVEY DEPTH:** 591' 11"

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
280' 8"	1" Hole in casing.
	Original hole before patch.

Perforations:	
Stainless Steel	324 - 592'
Wire Wrap	



Hole though
Casing and patc

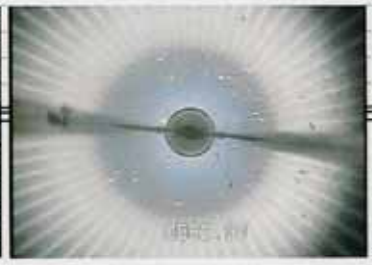
Pacific Surveys

a full service geophysical well logging company

Video Survey Report

Company:	Battelle Institute	**Date:**	09-Mar-11
Well:	Windsor	**Run No.**	One **Truck** PS-4
Field:	Altadena	**Job Ticket:**	15802
State:	California	**Total Depth:**	593 ft
		Water Level:	128 ft
Location:	2696 Windsor Ave.	**Oil on Water:**	None **Amount:** 0 ft
	GPS N34°11'29.8" W118°10'03.1"	**Guides at:**	13.00 in
Zero Datum:	Top of CSG **Tool Zero:** Side-Scan	**Operator:**	Nelson-Ridder
Reason for Survey:	General Inspection		

Depth	Remarks		
0.0 ft	Start survey at top of casing.	**Perforation:**	
127.7 ft	SWL; Water clear.	Stainless Steel	324.50 ft to ?
210.0 ft	Light to medium scale build-up	Wire Wrap	
260.0 ft	Small nodules.		
278.4 ft	Top of patch Bottom is at 282.6 ft. Patch appears in good shape.		
280.8 ft	Hole in liner. Water is jetting horizontally with discernible velocity.		
	Bio-fouling material breaks apart as it passes the water jet.		
	Staining is observed at bottom of patch that maybe be from water production.		
324.2 ft	Casing change to stainless steel.		
324.5 ft	Top of screen; appears open. Gravel pack is observed.		
350.0 ft	Screen appear open.	**Casing Size**	
364.6 ft	Bio-growth.	Steel	
377.0 ft	Bio-growth.	**13.75 in I.D.**	0.00 ft to 324.20ft
475.0 ft	Screen appear open.	**Stainless Steel**	
540.0 ft	Screen appear open.	**13.75 in I.D.**	324.20 ft to 592.60ft
588.0 ft	Heavy bio-growth.		
592.6 ft	Fill; still in screen. End survey.		



800.919.7555
909.625.6262

4456 via st. ambrose
claremont ca 91711
www.pacificsurveys.com

fax: 909.399.3180

ROSCOE MOSS COMPANY

4360 WORTH STREET
LOS ANGELES, CAL.

WELL CONTRACTORS — RENTAL TOOLS

Log of Well No. Arroyo Drilled for City of Pasadena

At Arroyo SecQ. Pasadena, Calif.

Started Work June 10, 1930

Completed Work August 1930

Total depth 668 Size of shoe 26 x 20 x 1 3/4

660 ft. of 26 inch 8 lb. or gauge casing used 550 left in Well

" " " " " " " " " " " "

" " " " " " " " " " " "

" " " " " " " " " " " "

" " " " " " " " " " " "

" " " " " " " " " " " "

Type of Perforator used Mills

Perforated	127	ft. to	302	ft.	12	Holes per	14	inches
"	306	" "	331	"	12	" "	14	"
"	367	" "	372	"	12	" "	14	"
"	398	" "	404	"	12	" "	14	"
"	457	" "	489	"	12	" "	14	"
"	498	" "	506	"	8	" "	14	"
"	508	" "	524	"	12	" "	14	"
"	538	" "	554	"	12	" "	14	"
"	568	" "	594	"	12	" "	14	"
	598		627		12		14	

Make diagram of perforation in square, showing dimensions.

Diameter of Perforations 5/8 inches

Length of Perforations 5 "

Depth at which water was first found 127 ft.

Standing level before perforating varied 148 to 168

Standing level after perforating 156 "

Note below your observation of any change in water level while drilling

At 340' water lowered from 127 to 150 which corresponds to levels in all other wells in Monk Hill Basin.

Water level when first started Test ft.

Draw down from standing level "

No. of gallons per minute pumped when Test first started

No. of gallons per minute pumped when Test completed

Draw down at completion of Test ft.

Formation: Mention size of water gravel—

0	ft. to	127	ft.	Pit
127	" "	144	"	Tight sand, gravel & boulders
144	" "	146	"	Clay & gravel
146	" "	175	"	Clay, sand, gravel & boulders

175	" "	180	" Loose dirty sand & gravel
180	" "	190	" Tight sand, gravel & boulders
190	" "	197	" Tight sand & gravel 4".
197	" "	198	" Sandy clay
198	" "	223	" Loose dirty sand & gravel 3".
223	" "	238	" Tight clay & gravel
238	" "	270	" Tight sand, gravel & boulders
270	" "	280	" Dirty loose sand & gravel 1".
280	" "	287	" Tight gravel & boulders
287	" "	299	" loose dirty sand & gravel 2".
299	" "	306	" Hard sandy clay
306	" "	319	" Tight sand, gravel & boulders
319	" "	331	" Clay, sand & gravel 1".
331	" "	340	" Soft sandy clay. Balance log on back.

If reducing strings of casing were cut off, state how cut

Depth from surface cut ft.

Size of casing cut in.

Lap in larger casing ft.

Was adapter or cement used?

If casing was swedged or repaired, state depth, describe repairs and condition in which casing was left and probable future effect:

Ran 25½" swedge before perforating
Swedge went to bottom freely.

Made drawing of adapter in square, showing dimensions.

Is well straight, top to bottom, and if not, what is the variation? Straight

South and west at bottom of pit, following crook in 4 ply starter, continued same direction all the way.

Will there be any detrimental effect on pump, and if so, what effect?

Pump will run OK

Give any additional data which may be of future value

Well took 60 tons gravel while drilling - 10 tons while perforating and sand pumping.

Open hole 660 to 668, was filled with boulders.

Driller must fill in report as work progresses and report must be complete for his successor.

Date of report August 22 1930

C.R.Seitz.
Driller

Formation continued:

340 to	346	Hard sandy clay
346	348	Packed sand & clay
348	367	Sandy clay
367	372	Clay & gravel 3"
372	379	Hard sandy clay
379	381	Clay & gravel
381	389	Tough yellow clay with gravel
389	398	Tough sandy clay
398	401	Clay & gravel
401	425	Tough clay with gravel
425	431	Clay & gravel
431	436	Sandy clay
436	457	Tough sandy clay
457	471	Loose dirty sand & gravel 1"
471	475	Semi cemented gravel 4".
475	485	Cemented sand.
485	489	Tight sand, gravel & nigger heads 6".
489	498	Sandy clay
498	503	Clay, sand & gravel 1".
503	508	Tough sandy clay
508	514	Semi cemented sand & gravel 2".
514	517	Loose dirty sand & gravel 2".
517	521	Clay gravel & boulders.
521	530	Tough sandy clay
530	538	Hard red sandy clay
538	549	Cemented sand & gravel
549	554	Tight sand & gravel 4".
554	560	Soft sandy clay
560	568	Hard sandy clay
568	580	Tight sand & gravel 4".
580	581	Sandy yellow clay
581	594	Tight sand & gravel 4".
594	598	Yellow sandy clay
598	612	Tight sand, gravel & boulders
612	615	Decomposed gravel & clay.
615	618	Cemented gravel 2".
618	624	Tight sand & gravel 2".
624	660	Sand, gravel & niggerheads in clay.
660	668	Blue granite (bed rock).

Arroyo Well.
City of Pasadena,
C.R. Seitz. Aug. 22,1930.

F-22-23

APPENDIX 2-21: Summary Video Log Inspection Sheets for Arroyo Well

Pacific Surveys

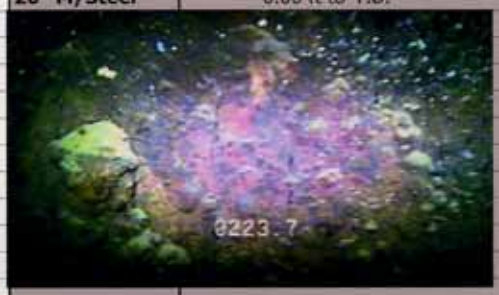
a full service geophysical well logging company

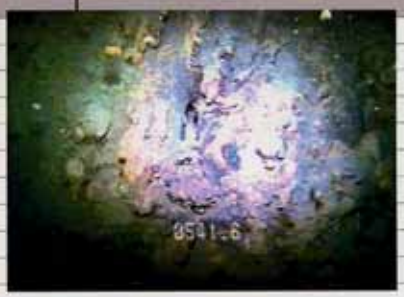
Video Survey Report

Company:	Battelle	**Date:**	16-Sep-03
Well:	Arroyo Well	**Run No.**	One
Field:	JPL	**Job Ticket:**	10997
State:	California	**Total Depth:**	628 ft
		Water Level:	100 ft
Location:	Upper Arroyo Canyon		
Zero Datum:	Top of Casing	**Tool Zero:**	Side-Scan
Reason for Survey:	General Inspection		

Depth	Remarks
5.0 ft	Start of Survey ; Wellhead sheave in pumphouse
99.6 ft	Static water level; cloudy, moderate particles
	light scale
223.8 ft	Top of perfs; vertical Mill slots, mostly open
	Partial plugging
324.0 ft	Liner bottom; Mills knife perfs in casing below liner
332.0 ft	Bottom of perfs
361.0 ft	Some perfs visible; extreme plugging in most perfs
	clearing
462.0 ft	Top of perfs; mostly plugged
490.0 ft	Bottom of perfs
498.0 ft	Perfs; plugged
524.0 ft	Bottom of perfs
541.0 ft	Perfs; most plugged
570.0 ft	Some perfs visible; extreme plugging in most perfs
594.0 ft	Some perfs visible; extreme plugging
611.0 ft	Airline
627.5 ft	Bottom; Fill

Perforation:	
Horizontal	248.20 ft to 369.00ft
Louvers	374.00 ft to 620.50ft
Casing Size	
20" M/Steel	0.00 ft to T.D.





Notes: All depths are referenced to side-scan. Downview lense is 5" below side-scan.

4456 via st. ambrose
claremont ca 91711

800.919.7555
909.625.6262

fax: 909.399.3180

Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle, City of Pasadena, Arroyo
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena,Ca.
GPS LOCATION: Latitude: N ° | Longitude: W °

WELL NUMBER: Arroyo **JOB NUMBER:** 1000-1221

SURVEYED BY: Tim Narwold **DATE:** 15-Jul-09

REVIEWED BY: **WATER LEVEL:** 96'

WATER CONDITION: Cloudy/Clear **TOTAL DEPTH:** Unknown

CASING DIAMETER: 19.5 ID **SURVEY DEPTH:** 626'

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
0-96'	Casing has light scale.
96-165'	Casing has light scale and growth with nodules
165-180'	Casing has moderate scale and growth with nodules
180-225'	Casing has heavy scale and growth with nodules
225-626	Casing has very heavy scale and growth with nodules
324'	Bottom of liner
612'	Air line in well
626'	Light bar enters fill and will not pass

Perforation:	
Horizontal	225-324'
Louver	448-?

Well Inspection Report

CLIENT: Battelle/JPL
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena,Ca.
GPS LOCATION: Latitude: N 34° 11' 51.3" | Longitude: W 118° 10' 1.7"

WELL NUMBER: Arroyo **JOB NUMBER:** 1000-1968

SURVEYED BY: Daniel De La Rosa **DATE:** 16-Jun-10

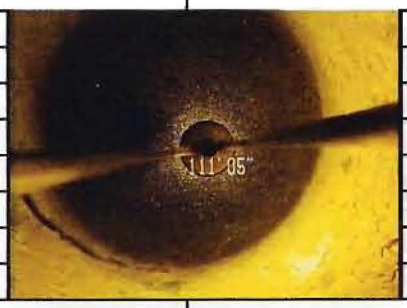
REVIEWED BY: **WATER LEVEL:** 63' 2"

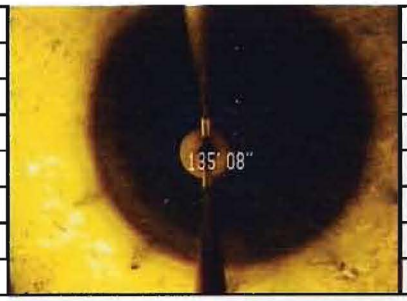
WATER CONDITION: Clear/Cloudy **TOTAL DEPTH:** Unknown

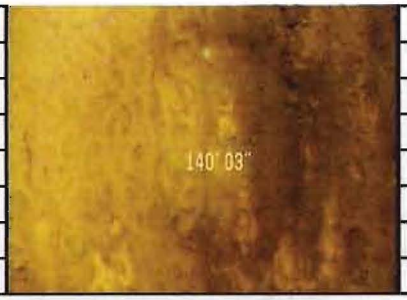
CASING DIAMETER: 26.00" ID **SURVEY DEPTH:** 627' 9"

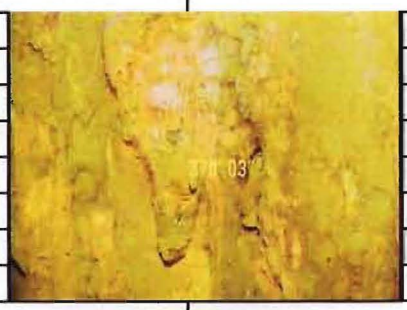
*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS		
5 - 63'	Casing appears to have moderate scale and growth.	**Perforation:**	
9' 7"	Access port enters casing.		
63 - 113'	Casing appears to have mild scale and growth.	**Mills Knife**	129 - 332'?
113'	Casing appears to have shifted at seam.		370 - 374?
113 - 170'	Casing appears to have increased scale and growth.		400 - ?
113 - 151?	Casing appears to have rivet seam along side.		448 - 627'
170 - 322'	Casing appears to have moderate scale and growth.		
322 - 532'	Casing appears to have increased scale and growth.		
532 - 627'	Casing appears to have heavy scale and growth with,		
	some poor visibility.		
613 - 627'	Airline in casing.		
627' 9"	Camera light bar enters fill, video is stopped at side view perspective.		









Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: JPL - Battelle
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena,Ca.
GPS LOCATION: Latitude: N 34° 11' 51.3" | Longitude: W 118° 10' 01.8"

WELL NUMBER: Arroyo **After Liner** **JOB NUMBER:** 1000-1221

SURVEYED BY: Jeff Conner **DATE:** 30-Nov-10

REVIEWED BY: **WATER LEVEL:** 79' 2"

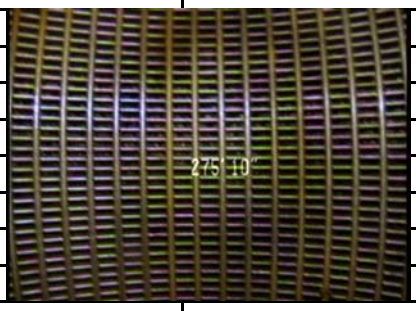
WATER CONDITION: Cloudy/Clear **TOTAL DEPTH:** 643'

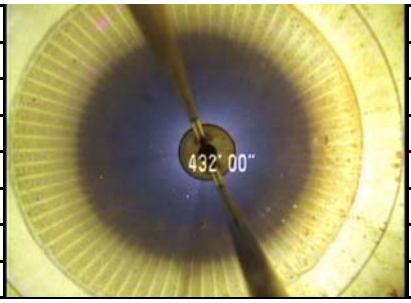
CASING DIAMETER: 18.00" ID **SURVEY DEPTH:** 640' 2"

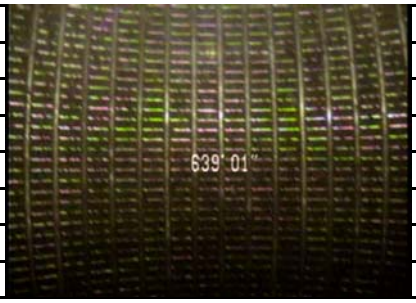
*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
5 - 79'	Casing appears to have mild scale.
79' 2"	Camera enters static water level.
79 - 268'	Casing appears to have mild growth.
268 - 273'	Dielectric coupling.
273 - 380'	Casing appears to have moderate growth.
380 - 635'	Casing appears to have heavy growth.
635 - 640'	Casing appears to have mild growth.
640' 2"	Camera enters fill to side perspective, and video is stopped.

Perforation:	
Stainless Steel Wire Wrap	273 - 643'







Water Systems Engineering Inc.
3201 Labette Terrace
P.O. Box 700
Ottawa, KS 66067-0700
Phone: 785-242-6166
Fax: 785-242-9411

WATER TREATMENT ANALYSIS AND CONTROL REPORT

David J. Conner
Battelle Memorial Institute
65 West Dayton St. - #407
Pasadena, CA 91105

Date: July 2, 2010

Lab Report No. 18525

RE: City of Pasadena, Arroyo Well; Samples dated 6/17/10
Complete Profile (1); P.O. #216906

NA - Not Applicable
ND - Not Detected
*(as $CaCO_3$)

	ARROYO WELL		Detection Limits
	65' mg/l	310' mg/l	
pH Value	7.89	7.87	NA
Phenolphthalein Alkalinity*	ND	ND	4 mg/L
Total Alkalinity*	140	212	4 mg/L
Hydroxide Alkalinity	ND	ND	4 mg/L
Carbonate Alkalinity	ND	ND	4 mg/L
Bicarbonate Alkalinity	140	212	4 mg/L
Total Dissolved Solids	554	333	1.0 mg/l
Conductivity (µm or µS/cm)	769	462	NA
ORP (mV)	425	401	0.1 mV
Langelier Saturation Index	+0.09	+0.07	NA
Total Hardness*	212	196	4 mg/L
Carbonate Hardness	140	196	4 mg/L
Non Carbonate Hardness	72	0	4 mg/L
Calcium*	140	132	4 mg/L
Magnesium*	72	64	4 mg/L
Sodium (as Na)	22.0	5.79	5.0 mg/L
Potassium (as K)	3.8	3.0	0.1 mg/L
Chlorides (as Cl)	56.8	14.8	2 mg/L
Nitrate (Nitrogen)	1.1	ND	0.3 mg/L
Chlorine (as Cl)	ND	ND	0.02 mg/L
Dissolved Iron (as Fe^{2+})	ND	ND	0.02 mg/L
Suspended Iron (as Fe^{3+})	0.49	0.69	0.02 mg/L
Iron Total (as Fe)	0.49	0.69	0.02 mg/l
Iron (resuspended)	24.75	28.9	0.02 mg/l
Copper (as Cu)	ND	ND	0.04 mg/L
Manganese (as Mn)	ND	ND	0.1 mg/L
Phosphate (as PO_4)	0.22	0.06	0.06 mg/L
Sulfate (as SO_4)	112	19	2 mg/L
Silica (as SiO_2)	14.2	21.1	1.0 mg/L
Tannin/Lignin	0.2	0.1	0.1 mg/L
Total Organic Carbon (C)	2.5	0.9	0.0 mg/L

Bacterial Analysis:

F = Filtered M = Million	ARROYO WELL 65'	 310'
Plate Count (colonies/ml)	200	550
Anaerobic Growth	15%	15%
Sulfate Reducing Bacteria	Negative	Negative
Fe / Mn Oxidizing Bacteria	Positive	Positive
ATP (cells per ml) Initial	912,000 471,000 (F)	1.8 M 1.3 M (F)
ATP (cells per ml) 24 hour	1.1 M 1.2 (F)	1.5 M 888,000 (F)
Total Coliform Bacteria	Negative	Negative
E. coli Coliform Bacteria	Negative	Negative

Bacterial Identification:

65': *Microbacterium saperdae; Bacillus mycoides; Gallionella*

310': *Microbacterium laevaniformans; Psychrobacter phenylpyruvicus; Bacillus licheniformis; Gallionella*

Microscopic Evaluation:

65': Moderate visible bacterial activity with trace of clay particulate matter, light amount of crystals, heavy iron oxide with moderate number of Gallionella.

310': Moderate visible bacterial activity with light amount of clay particulate matter, moderate number of crystals, heavy iron oxide with moderate number of Gallionella.

Observations and Interpretations:

When received in the lab both samples from the Arroyo well were clear with some sediment at the bottom. Chemical analysis found generally a higher concentration of dissolved minerals in the 65 foot sample than in the 310 foot sample. The likely explanation for this is that, since the well has not been pumped for several years and the samples were taken with thief samplers at discrete depths, the 310 foot sample was from an area closer to the open screen area and was therefore more diluted by natural groundwater migration. The analysis found moderately high hardness in both samples with a significant non-carbonate hardness component present in the 65 foot sample. Alkalinity was moderate with an alkaline pH. Total dissolved solids and conductivity were excessive in the 65 foot sample but closer to normal values in the 310 foot sample. The oxidation-reduction potential indicates an oxidative condition existing within the well which can lead to the precipitation of metal oxides. The calculated Langelier Saturation Index indicates a balanced condition exists with respect to the calcium carbonate content in both samples.

The inorganic chemical analysis found sodium to be elevated in the 65 foot sample and potassium elevated in both samples. Iron as total iron and suspended iron were slightly elevated in both samples but the resuspended iron was considerably high in both samples. Resuspended iron is the result of chemically oxidized as well as biologically mobilized iron and can be an indication of overall bacterial activity.

Total organic carbon which is the amount of carbon bound in organic compounds was significantly elevated in the 65 foot sample. Total organic carbon results from the natural decay of organic matter and can also result from synthetic sources such as pesticides, herbicides, fertilizers, and detergents.

Bacterial analysis found moderate bacterial growth on the heterotrophic plates. The dominant organisms were identified as *Microbacterium* and *Bacillus specie*, both of which are considered non-pathogenic organisms. They are widely distributed in nature including in soils, water including groundwater, and decaying vegetation; and are prolific slime forming organisms. *Psychrobacter phenylpyruvicus* was also identified in the 310 foot sample. This is also a naturally occurring organism in the environment. Although little is known about it, it is believed to be an opportunistic pathogen with the ability to cause infection in individuals with a compromised immune system.

Anaerobic organisms were present at 15% of the total population in both samples. Both samples tested negative for sulfate reducing organisms as well as total coliforms including E-coli. Adenosine triphosphate (ATP) which is a measure of the total amount of cellular material present in the samples was excessive in both samples. Any value over 100,000 is of concern for bacterial congestion. After filtering through a 3 micron filter to remove biomass and larger organisms the counts remained excessively high for an active well system.

The microscopic evaluation identified moderate levels of visible bacterial activity in both samples along with heavy levels of iron oxide based biofilm. Very low to low levels of plant particulate matter were observed in the samples with low to moderate levels of crystalline material.

The dominant bacterial organism identified in the microscopic evaluation was the iron oxidizing organism *Gallionella*. *Gallionella* are a larger, stalked bacterium that utilize iron as an energy source and secrete an iron-oxy-hydroxide byproduct. This secretion is often responsible for accumulations of iron oxide in wells and piping systems. Furthermore, the stalked nature of the bacteria rapidly clogs well screens and pump intakes, reducing flow into and out of wells. The secreted stalks are often shed during cycling of the well, resulting in surges of red water and spikes in total iron readings. *Gallionella* are known to migrate beyond the well system and can foul transmission lines and filter systems. *Gallionella* are a naturally occurring bacteria found in a variety of aquatic environments including aquifers. In addition to fouling concerns, *Gallionella* are a chief form of microbial induced corrosion. In its attachment to iron bearing surfaces, *Gallionella* pits the metal in an effort to secure the iron necessary for energy. All iron bearing structures, including stainless steel, are susceptible to this form of pitting.

The *Gallionella* occurrence is of concern beyond biofouling capability. As accumulations of the iron-oxy-hydroxide stalks build within the well, the base layers tend to dehydrate, resulting in a harder, more dynamic iron oxide scale. These scale accumulations are very

effective fouling mechanisms within the well and pump. High *Gallionella* populations typically result in a higher degree of required pump maintenance due to fouling of the intakes and iron oxide accumulations within the pump bowls.

Very low levels of plant particulate matter were also present as well as low levels of crystalline material but no multicellular organisms were observed.

In summary, the chemistry of both water samples indicated fairly high mineralization with a moderate potential for mineral scale formation. The high biological load in the samples indicates significant bacterial congestion. Biofouling will also act as a catalyst for mineral scale accumulation, increasing the potential for encrustation and plugging within the well environment.

Since a high level of bacterial growth is currently present, conducting a thorough cleaning and disinfection of the well prior to installing the proposed liner should reduce the potential problems associated with the heavy bacterial population once the well is put back into service.

The cleaning process should begin with inspecting the well to insure its integrity prior to cleaning. This will determine if the well casing is able to stand up to an aggressive mechanical and chemical rehabilitation. Provided that the well is structurally sound, the well should be cleaned with a mild acid solution combined with a dispersion polymer being mechanically worked into the screened sections followed by a multi-volume disinfection effort using a pH stabilized chlorine solution.

The interpretations presented are based on an evaluation of the water samples and submitted data. The recommended treatment is based on laboratory and field evaluations of similar fouling occurrences within potable well systems. Further investigative efforts, such as a pump test, video survey, or other evaluation methods may offer additional insight into the well's condition and the degree of fouling.

We appreciate the opportunity to be of service, and, if you have any questions concerning this report, do not hesitate to contact me at 913.707.5926.

Sincerely,
Water Systems Engineering, Inc.

Paul D. Buozis
Professional Geologist

Water Systems Engineering Inc.
3201 Labette Terrace
P.O. Box 700
Ottawa, KS 66067-0700
Phone: 785-242-6166
Fax: 785-242-9411

WATER TREATMENT ANALYSIS AND CONTROL REPORT

David J. Conner
Battelle Memorial Institute
65 West Dayton St. - #407
Pasadena, CA 91105

Date: November 17, 2010

Lab Report No. 18663

Re: City of Pasadena, Arroyo Well; Samples dated 10/25/10
Complete Profile (1); P.O. #216906

NA - Not Applicable
ND - Not Detected
*(as $CaCO_3$)

	ARROYO WELL		Detection Limits
	470' mg/l	268' mg/l	
pH Value	6.53	6.72	NA
Phenolphthalein Alkalinity*	ND	ND	4 mg/L
Total Alkalinity*	84	152	4 mg/L
Hydroxide Alkalinity	ND	ND	4 mg/L
Carbonate Alkalinity	ND	ND	4 mg/L
Bicarbonate Alkalinity	84	152	4 mg/L
Total Dissolved Solids	657	492	1.0 mg/l
Conductivity (µm or µS/cm)	912	683	NA
ORP (mV)	347	346	0.1 mV
Langelier Saturation Index	- 1.17	- 0.78	NA
Total Hardness*	356	272	4 mg/L
Carbonate Hardness	84	152	4 mg/L
Non Carbonate Hardness	272	120	4 mg/L
Calcium*	228	184	4 mg/L
Magnesium*	128	88	4 mg/L
Sodium (as Na)	20.0	19.9	5.0 mg/L
Potassium (as K)	4.3	3.4	0.1 mg/L
Chlorides (as Cl)	192.8	78.4	2 mg/L
Nitrate (Nitrogen)	2.2	3.7	0.3 mg/L
Chlorine (as Cl)	ND	0.11	0.02 mg/L
Dissolved Iron (as Fe^{2+})	ND	ND	0.02 mg/L
Suspended Iron (as Fe^{3+})	0.33	0.15	0.02 mg/L
Iron Total (as Fe)	0.33	0.15	0.02 mg/l
Iron (resuspended)	12.9	0.37	0.02 mg/l
Copper (as Cu)	ND	ND	0.04 mg/L
Manganese (as Mn)	3.7	0.7	0.1 mg/L
Phosphate (as PO_4)	1.88	1.77	0.06 mg/L
Sulfate (as SO_4)	33	48	2 mg/L
Silica (as SiO_2)	53.1	38.3	1.0 mg/L
Tannin/Lignin	0.5	0.2	0.1 mg/L
Total Organic Carbon (C)	1.4	0.6	0.0 mg/L

Bacterial Analysis:

F = Filtered M = Million	ARROYO WELL 470'	 268'
Plate Count (colonies/ml)	>1,500	440
Anaerobic Growth	30%	20%
Sulfate Reducing Bacteria	Negative	Negative
Fe / Mn Oxidizing Bacteria	Positive	Positive
ATP (cells per ml) Initial	2.4 M 2.1 M (F)	598,000 494,000 (F)
ATP (cells per ml) 24 hour	5.0 M 2.1 M (F)	537,000 386,000 (F)
Total Coliform Bacteria	Negative	Positive 2 / 10 ml
E. coli Coliform Bacteria	Negative	Negative

Bacterial Identification:

470': *Gallionella, Ralstonia pickettii, Bacillus specie*

268': *Acinetobacter calcoaceticus bv alc, Bacillus species, Gallionella*

Microscopic Evaluation:

470': Moderate to heavy visible bacterial activity with moderate number of protozoa, extremely high iron oxide with excessive number of Gallionella.
268': Moderate visible bacterial activity with minor number of protozoa, moderate number of crystals, moderate iron oxide with moderate number of Gallionella.

Observations and Interpretations:

In comparing the chemical analysis from the 470-foot sample and the 268-foot sample, the 470-foot sample contained a generally higher level of dissolved minerals. In comparing the results of this analysis, which was conducted following an extensive well rehabilitation process, with the results from a pretreatment analysis presented in WSE Report No. 18525, dated July 2, 2010, there are significant differences. In general, there is a much higher level of dissolved chemicals in this analysis than in the previous analysis. Also, in the July analysis the samples had an alkaline pH while in this analysis the pH is acidic.

The most likely explanation for this difference is the result of the Aqua Freed^{R} process used in the rehabilitation process. This process uses carbon dioxide which, when combined with water in the well can form acid which aids in the cleaning process. The presence of this acid will reduce the pH and increase the amount of dissolved minerals present. This

difference should diminish over time as the well is pumped and the residual affects decrease.

The bacterial assessment found considerable heterotrophic plate growth with over 1,500 colony forming cells per milliliter in the 470-foot sample and 440 in the 268-foot sample. The organisms identified are common environmental organisms with the ability to produce large amounts of biofilm if allowed to proliferate. *Ralstonia pickettii* and *Acinetobacter calcoaceticus* are considered opportunistic pathogens and may cause infection in individuals with compromised immune systems.

Adenosine triphosphate (ATP), which is a measure of cellular material present and is an indication of bacterial growth, was found to be excessive in both samples. Even after filtering through a 3 micron filter to remove biomass and multicellular organisms the ATP counts remained extremely high. ATP levels for a properly functioning well system not experiencing excessive bacterial activity is 20,000 to 60,000 cells per milliliter of sample while any count above 100,000 is of concern for bacterial congestion. Anaerobic growth represented 20% of the total microbial growth in the 268-foot sample and 30% in the 470-foot sample. No sulfate reducing bacteria were noted in either sample. Total coliforms were noted in the 268-foot sample at 2 cells per milliliter of sample. No E-Coli were identified in the samples.

The microscopic evaluation of the 470-foot sample found moderate to heavy levels of visible bacterial activity. This sample also contained moderate levels of protozoa and extreme levels of both iron oxide biofilm and the iron oxidizing organism *Gallionella*.

The microscopic evaluation of the 268-foot sample found moderate levels of visible bacterial activity, moderate amounts of crystalline material, and a moderate amount of iron oxide biofilm and *Gallionella.* Low amounts of protozoa were also found in the 268-foot sample.

Recommendations:

The presence of elevated levels of ATP, resuspended iron, iron oxide biofilm, and *Gallionella* are indications that active bacterial growth remains in the well at an excessive level even though it was recently cleaned.

Since the samples were taken immediately after completion of the rehabilitation process, the samples may not be true representations of the condition of the well. It would be advisable to pump the well aggressively to remove free floating microorganisms which may be causing the high ATP and microscopic results before they become attached as well as remove the residual effects of the treatment process. This should be followed by quarterly bacterial assessments to monitor bacterial regrowth. If the bacterial population does not drop with pumping, it may be advisable to conduct a follow-up disinfection with a pH adjusted chlorine solution.

Placing the well on an active operating schedule as soon as possible will help keep the bacterial level down. Regular operation of the well should also aid in reducing the amount of anaerobic organisms present which can cause taste and odor problems.

The observations and interpretations presented are based on an evaluation of the water samples and submitted data. The recommendations are based on laboratory and field evaluations of similar impacted well systems. Further investigative efforts or other evaluation methods are encouraged and may offer additional insight into the well's condition and the degree of fouling present.

If you have any questions regarding the analyses or the information presented, please contact our office.

Paul D. Buozis
Professional Geologist

A.L = Air Line

MHTS Municipal Production Well Log Sheet - Arroyo

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100) Start	Totalizer (x 100) Finish	Generator Hour Meter Beginning of Day	Generator Hour Meter End of Day	Comments
06-22-10	619/631	0831	09:15	OEAL	44		020385	—	004473	—	JET BIK WATER DARK BROWN WATER / stop to Fix TOTALIZER
06-22-10	BOTTOM Fill	0943	13:24	OEAL	3hr31min		—	020622	—	—	PH 7.6 | 12:40 LOT of SAND WELL AT 628"
06-22-10	APPOX 631-651	13:55	16:48	OEAL	2hrs 53min		020622	020750	—	004554	TANK 1 15,278 | TANK 2 15,083 | TANK 3 13,023 gallons
06-23-10	643/651	07:46	8:00	OEAL	74min		020756	020825	004554	—	PH = 6.0 Rusty color water
06-23-10	651/660	10:50	11:02	OEAL	12min		020825	020894	—	004593	muddy looking color still lots of SAND 652"
06-24-10	129/139	10:38	10:56	DSAL	18min		020894	020901	004593	—	A.L = 105'
06-24-10	139/149	12:14	12:31	DSAL	17		020901	020913	—	—	A.L = 126'
06-24-10	149/159	12:46	13:10	DSAL	24		020913	020930	—	—	
06-24-10	159/169	13:32	13:50	DSAL	18		020930	020942	—	—	
06-24-10	169/179	14:13	14:25	DSAL	12		020942	020953	—	—	
06-24-10	179/189	14:47	15:05	DSAL	18		020953	020966	—	—	
06-24-10	189/199	15:13	15:31	DSAL	18		020966	020979	—	—	TANK 1 | TANK 2 | TANK 3
06-24-10	199/209	15:57	16:16	DSAL	19		020979	020997	—	004645	18,012 | 17,231 | 16,841
06-25-10	209/219	07:45	08:03	DSAL	18		020997	021018	004645	—	
06-25-10	219/229	08:28	08:43	DSAL	15		021018	021032	—	—	
6-25-10	229/239	08:56	09:10	DSAL	14		021032	021049	—	—	
6-25-10	239/249	09:28	0:940	DSAL	12		021049	021058	—	004672	

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Arroyo

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100)		Generator Hour Meter		Comments
							Start	Finish	Beginning of Day	End of Day	
06-28-10	249/259	9:02	9:25	DSAL	23		021058	021092	004672	—	
06-28-10	259/269	9:45	10:08	DSAL	23		021092	021113	—	—	
06-28-10	269/279	10:15	10:30	DSAL	15		021113	021128	—	—	
06-28-10	279/289	10:51	11:07	DSAL	16		021128	021144	—	—	
06-28-10	289/299	11:22	11:31	DSAL	9		021144	—	—	—	LUNCH BREAK
06-28-10	299/309	12:57	1:15	DSAL	18		—	021163	—	—	
06-28-10	309/319	1:28	1:42	DSAL	15		021163	021173	—	—	
06-28-10	319/329	1:58	2:16	DSAL	18		021173	021189	—	—	
06-28-10	329/339	2:28	2:45	DSAL	17		021189	021202	—	—	
~~06-28-10~~	~~390/394~~	~~3:15~~		~~DSAL~~			~~021202~~				
6-28-10	360/378	3:15	3:36	DSAL	21		021202	021219	—	—	END of day
6-29-10	398/408	8:12	8:35	DSAL	25		021219	021245	004740	~~004740~~ 004740	GPM HRS
6-29-10	448/451	9:03	9:23	DSAL	20		021245	021266	~~004740~~	—	
6-29-10	451/461	9:37	10:00	DSAL	23		021266	021288	—	—	
6-29-10	461/471	10:10	10:45	DSAL	35		021288	021320	—	—	
6-29-10	471/481	11:05	11:20	DSAL	15		021320	021331	—	—	
6-29-10	481/491	12:18	12:43	DSAL	25		021331	021360	—	—	
6-29-10	491/501	12:57	1:31	DSAL	34		021360	021391	—	—	

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Arroyo

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100)		Generator Hour Meter		Comments
							Start	Finish	Beginning of Day	End of Day	
6·29·10	501/511	1:42	1:58	DSAL	16		021391	021399	004740	—	
6·29·10	511/521	2:14	2:32	DSAL	18		021399	021411	—	—	
6·29·10	521/531	3:13	3:41	DSAL	28		021411	021445	—	004820	NEED More SAFTY
6·30·10	531/541	8:14	8:34	DSAL	20		021445	021466	004820	—	SHEETS -
6·30·10	541/551	10:07	10:26	DSAL	25		021466	021486	—	—	
~~6·30·10~~	/			~~DSAL~~			~~021486~~				NEW ~~FLO~~ TOTALIZER
6·30·10	551/561	10:53	11:06	DSAL	13		001635	001656	—	—	
6·30·10	561/571	11:20	11:37	DSAL	17		001656	001683	—	—	
6·30·10	571/581	12:42	12:55	DSAL	13		001683	001698	—	—	
6·30·10	581/591	1:05	1:19	DSAL	14		001698	001722	—	—	
6·30·10	591/601	1:35	1:49	DSAL	14		001722	001739	—	—	WATER is dirty
6·30·10	601/611	1:59	2:13	DSAL	14		001739	001762	—	—	& foggy
6·30·10	611/621	2:35	2:53	DSAL	18		001762	001782	—	—	
6·30·10	621/627	3:03	3:22	DSAL	19		001782	001809	—	004897	ZONE 621/627
*											

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Arroyo

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100) Start	Totalizer (x 100) Finish	Generator Hour Meter Beginning of Day	Generator Hour Meter End of Day	Comments (TEST OEAL)
7-13-10	Fill starts At 644ft	2:13	2:20	OEAL	7		001818	—	004897	—	~~[illegible]~~ ✓ ~~[illegible]~~ (Test for Acid Hot)
7-13-10	" "	3:34	3:57	OEAL	23		—	001834	—	004900	PH=7 CL=0.03
7-14-10	" "	7:10	12:55	OEAL	285		001834	002101	004900	—	PH=6 CL=0.00
7-14-10	651/654	1:21	2:15	OEAL	54		002101	002138	—	004971	ADD Pipe
7-15-10	129/139	11:15	11:59	DSAL	44		002138	002156	004971	—	Bottom of well 656ft.
7-15-10	139/149	12:58	1:37	DSAL	39		002156	002178	—	—	Finished Totalizer (2200)
7-15-10	149/159	1:52	2:21	DSAL	29		002178	~~002182~~	—	—	
7-15-10	159/169	2:58	3:21	DSAL	23		002200	002223	—	—	
7-15-10	169/179	3:39	4:01	DSAL	22		002223	002247	—	005020	Totalizer gallons 10,900 gallons
7-16-10	179/189	7:54	8:24	DSAL	30		002247	002277	005020	—	
7-16-10	189/199	8:33	8:48	DSAL	15		002277	002300	—	—	
7-16-10	199/209	9:09	9:35	DSAL	26		002300	[illegible]	—	—	Totalizer FINISH 002333
7-16-10	209/219	9:47	10:04	DSAL	16		002333	002359	—	—	
7-16-10	219/229	10:22	10:47	DSAL	25		002359	002390	—	—	
7-16-10	229/239	10:57	11:30	DSAL	33		002390	002437	—	—	
7-16-10	239/249	12:26	1:12	DSAL	46		002437	002498	—	—	
7-16-10	249/259	1:22	1:33	DSAL	11		002498	002518	—	—	
7-16-10	259/269	1:47	2:08	DSAL	21		002518	002549	—	—	* NEED NEW MHTS Municipal Production well SHEET (Arroyo) *
7-16-10	269/279	2:21	2:40	DSAL	19		002549	002579	—	005097	

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

TOTAL GALLONS
7-16-10 Fri
33200 gallons

MHTS Municipal Production Well Log Sheet - Arroyo

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100)		Generator Hour Meter		Comments
							Start	Finish	Beginning of Day	End of Day	
7-19-10	279/289	08:06	08:37	DSAL	31		002579	002626	005097	–	Pump start 8:06
7-19-10	289/299	08:49	09:05	DSAL	16		002626	002652	–	–	
7-19-10	299/309	09:24	9:46	DSAL	22		002652	002681	–	–	
7-19-10	309/319	9:59	10:20	DSAL	21		002681	002701	–	–	
7-19-10	319/329	10:35	10:57	DSAL	22		002701	002741	–	–	
7-19-10	329/332	11:05	11:17	DSAL	12		002741	002756	–	–	
7-19-10	370/374	11:40	11:50	DSAL	10		002756	002771	–	–	Totalizer finish 002771
7-19-10	400/403	12:12	12:23	DSAL	11		002771	002791	–	–	
7-19-10	448/452	120	1:35	DSAL	15		002791	002809	–	–	
7-19-10	452/462	1:45	2:00	DSAL	15		002809	002836	–	–	
7-19-10	462/472	2:31	2:50	DSAL	19		002836	002865	–	–	minutes pump 19
7-19-10	472/482	3:06	3:23	DSAL	17		002865	002887	–	–	
7-19-10	482/492	3:31	3:55	DSAL	24		002887	002924	–	005186	Total gallons pump 34,500 gallons
7-20-10	492/502	8:40	8:57	DSAL	17		002924	002944	005186	–	
7-20-10	502/512	9:09	9:23	DSAL	14		002944	002958	–	–	
7-20-10	512/522	9:38	9:57	DSAL	19		002958	002981	–	–	
7-20-10	522/532	10:14	10:31	DSAL	17		002981	003003	–	–	
7-20-10	532/542	10:47	11:14	DSAL	27	↓	003003	003036	–	–	

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Arroyo

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100)		Generator Hour Meter		Comments
							Start	Finish	Beginning of Day	End of Day	
7·20·10	542/552	11:19	11:45	DSAL	26		003036	003086	005186	–	
720·10	552/562	12:31	12:52	DSAL	22		003086	003112	–	–	
7·20·10	567/572	1:02	1:19	DSAL	17		003112	003129	–	–	
7·20·10	572/582	1:25	1:45	DSAL	20		003129	003155	–	–	
7·20·10	582/592	2:04	2:20	DSAL	16		003155	003167	–	–	
7·20·10	592/602	2:44	3:10	DSAL	16		003167	003193	–	–	Totalizer Start & End DAY
7·20·10	602/612	3:21	3:41	DSAL	20		003193	003217	–	005264	00321700 - 00292400 = 29,300gal.
721·10	612/622	8:23	8:40	DSAL	17		003217	003245	005264	–	
7·21·10	622/632	9:04	9:23	DSAL	19		003245	003265	–	005276	

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Arroyo

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100)		Generator Hour Meter		Comments
							Start	Finish	Beginning of Day	End of Day	
8·25·10	273/277	1:42	2:03	DSAL	21		003761	003782	005422	—	TOTALIZER FINISHED 10,000gal 8·25·10
8·25·10	277/287	2:20	2:35	DSAL	15		003782	003797	—	—	
8·25·10	287/297	2:52	3:05	DSAL	13		003797	003825	—	—	
8·25·10	297/307	3:39	3:51	DSAL	12		003825	003840	—	—	
8·25·10	307/317	4:03	4:19	DSAL	16		003840	003861	—	005445	
8·26·10	317/327	8:16	8:42	DSAL	26		003861	003888	005445	—	
8·26·10	327/337	8:46	9:01	DSAL	15		003888	003915	—	—	
8·26·10	337/347	9:17	9:35	DSAL	18		003915	003938	—	—	PH=7.0
8·26·10	347/357	9:45	10:00	DSAL	15		003938	003961	—	—	
8·26·10	357/367	10:11	10:29	DSAL	18		003961	003984	—	—	
8·26·10	367/377	10:35	10:48	DSAL	13		003984	004006	—	—	WATER A little foggy Free of SAND & SILT
8·26·10	377/387	11:05	11:15	DSAL	10		004006	004006	—	—	Notice Totalizer stop
8·26·10	387/397	12:13	12:30	DSAL	17		004006	004006	—	—	working / Fixing Totalizer
8·26·10	397/407	1:03	1:18	DSAL	15		004006	004027	—	—	Fixed totalizer stick was inside
8·26·10	407/417	1:31	1:39	DSAL	8		004027	004041	—	—	APPOX 238 gallons
8·26·10	417/427	1:54	2:09	DSAL	15		004041	004061	—	—	EACH time missed X2 1,350gallons
8·26·10	427/437	2:19	2:33	DSAL	10		004061	004082	—	—	
8·26·10	437/447	2:46	3:00	DSAL	16		004082	004102	—	—	

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Arroyo

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	Minutes Pumped	GPM	Totalizer (x 100)		Generator Hour Meter		Comments
							Start	Finish	Beginning of Day	End of Day	
8·26·10	447/457	3:08	3:22	DSAL	14		004102	004123	005445	–	
8·26·10	457/467	3:43	3:54	DSAL	11		004123	004140	–	005518	
8·27·10	467/477	7:47	8:00	DSAL	13		004140	004163	005518	–	
8·27·10	477/487	8:32	8:45	DSAL	13		004163	004184	–	–	
8·27·10	487/497	8:56	9:12	DSAL	14		004184	004211	–	–	
8·27·10	497/507	9:25	9:40	DSAL	15		004211	004228	–	–	
8·27·10	507/517	9:48	10:00	DSAL	12		004228	004250	–	–	
8·27·10	517/527	10:16	10:37	DSAL	21		004250	004276	–	–	
8·27·10	527/537	10:44	10:56	DSAL	12		004276	004295	–	–	
8·27·10	537/547	11:15	11:29	DSAL	14		004295	004317	–	–	
8·27·10	547/557	12:17	12:27	DSAL	10		004317	004327	–	–	
8·27·10	557/567	12:40	12:53	DSAL	13		004327	004340	–	–	
8·27·10	567/577	12:58	1:08	DSAL	10		004340	004358	–	–	
8·27·10	577/587	1:20	1:28	DSAL	8		004358	004366	–	–	Pump Finished Time 1:28
8·27·10	587/597	1:32	1:39	DSAL	7		004366	004377	–	–	
8·27·10	597/607	2:01	2:10	DSAL	9		004377	004389	–	–	
8·27·10	607/617	2:15	2:25	DSAL	10	✓	004389	004402	–	005594	
	/			DSAL					–		

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

Layne Christensen Co.

Test Pump Data

Customer BATTELLE J.P.L Date 10-4-10 Job Number 1000-1968

Well Diameter _____ Depth of Well _____ Static Water Level 81.3' Well # and Name AROYO

Pump Setting 400' Airline Depth _____ Flowmeter: Start 21736000 End _____

How Q Measured METER How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down ___ Production ___

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS 21736000
1345	1ST	START	200G.P.M	VALVE	OFF	11:45	Started Pump
1355	.05	550	18.95	100.25	29.02	1000	
1405-1410							Surged well 3X
1420	.05	500	18.70	100.0	26.73	1000	
1430 (+1435)							Surged well 3 x
1445	.05	850	38.60	119.90	22.02	1205	Increased Flow rate
1455							Surged well 3X
1510	0.35 PPM .1	900	37.80	119.10	23.80	1205	
1520							Surged well 3x
1535	.05	1225	53.95	135.25	22.70	1360	Increased Flow rate
1545							Surged Well 3X
~~1545~~							
1600	7.0 PPM .2	1175	54.90	136.20	21.40	1359	
1610							Surged Well 3X
1625	3.5 PPM .1	1200	54.80	136.10	21.89	1361	
1635		SHUT	DOWN				Surged well 3X
							21860000
							124,000 PUMPED

Layne Christensen Co.

Test Pump Data

Customer Battelle J.P.L. Date 10-5-10 Job Number 1000-1968

Well Diameter _____ Depth of Well _____ Static Water Level 81.4 Well # and Name Arroyo

Pump Setting _____ Airline Depth _____ Flowmeter: Start 21860 End _____

How Q Measured Meter How W.L.s measured Elect. Test Type: Development ✓ StepDraw-Down ___ Production ___

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
0755							Start Pump
0805	.1	1200	56.05	137.45	21.40	1369	Clear PH=6.5
0815							Surged Well 3x
0830	.05	1200	55.93	137.33	21.45	1367	
0840							Surged Well 3x
0855	.05	1200	56.15	137.55	21.37	1368	Tannish/Brown
0905							Surged Well 3x
0920	.05	1200	56.0	137.40	21.42	1368	Clear, PH=6
0930							Surged Well 3x
0945	.05	1200	55.85	137.25	21.48	1368	
0955							Surged Well 3x
1010	.075	1400	69.9	151.30	20.02	1460	Increased Flow rate
1020							Surged Well 3x
1035	.1	1500	89.55	170.95	16.75	1564	Increased Flow rate, PH=6.5
1045							Surged Well 3x
1100	.2	1700	106.05	187.45	16.03	1661	Increased Flow rate
1110							Surged Well 3x
1125	.2	1900	125.75	207.15	15.10	1758	Increased Flow rate
1135							Surged Well 3x, Shut down Pump
1315							Start Pump
1325	.2	1900	125.25	206.65	15.16	1759	
1335							Surged Well 3x
1350	.2	1875	122.7	204.10	15.28	1760	
1400							Surged Well 3x
1415	.2	1900	124.40	205.80	15.27	1760	Clear, PH=6.5

Layne Christensen Co. **Test Pump Data**

Customer Battelle J.P.L. Date 10-5-10 Job Number 1000-1968

Well Diameter _____ Depth of Well _____ Static Water Level 81.4 Well # and Name Arroyo

Pump Setting _____ Airline Depth _____ Flowmeter: Start 21860 End _____

How Q Measured Meter How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down ___ Production ___

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
1425							Surged well 3x
1440	.2	1900	123.71	205.11	15.35	1759	Clear
1450							Surged well 3x
1505	.2	1900	123.11	204.51	15.43	1760	PH=6.5 Shut down Pump
							TURBITY 300
							22270000
							1002 RPM 1.5LBS DISC 81.55'
							0 G.P.M. @ 121.2'
							CURVE S/O/H 525'
							STUFF IN HOLE S/O/H 378'
							370
							525
							378

Layne Christensen Co. **Test Pump Data**

Customer BATTELLE J.P.L. Date 10-9-10 Job Number 1000-1968

Well Diameter _____ Depth of Well _____ Static Water Level 81.6' Well # and Name ARROYO

Pump Setting 400' Airline Depth _____ Flowmeter: Start 22278.500 End _____

How Q Measured METER How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down___ Production___

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS 22278.500
	START UP AFTER 3 SURGES						VERY CLOUDY
7:55 AM	TRACE					1001	Surge well Pump 3-Times
8:31 AM						1083	start
8:34		1500		146.2		1115	Adjust Pump Rpm
8:46 AM	.1	1500	65.9	147.5	22.7	1115	FLOW METER 22302 6½ PSI DISCHARGE PRESS
8:51 AM							SURGE well 4 TIMES
859	.1					1117	RESTART PUMP 1500 GPM
903 AM		1600				1165	INCREASE 50 RPM
906 AM	.4	1600	74.1	155.7	21.5	1165	
9:11 AM							SURGE well PUMP 4 TIMES
9.19 AM	.5						START AT 1035 INCREASE TO 1215
925		1659					WATERS clear little cloudy TRACE AMOUNTS OF SAND
929	.6	1659	84.5	166.1	19.6	1214	
942	.6	1659	86.6	168.2	19.1	1214	
950	.6	1659	87.1	168.7	19.0	1214	levels DROPING slowly
951	.6						SURGE well PUMP 4 TIMES
10.01	.6						START AT 1035 INCREASE TO 1314 RPM
10.06	.8	1779				1321	LOTS OF AIR BUBBLES IN WATER
1021	.9	1779	108.2	189.8	16.4	1321	
1026							SURGE well PUMP 4 TIMES
10:33	.9					1023	Restart well Pump
10:38		2068				1422	Increase In Sand Prod During Step-D
1052	1.0	2068	130.4	212'	15.8	1422	SAND STARTED CLEARING UP

Layne Christensen Co.

Test Pump Data

Customer Battelle Date 10-9-10 Job Number 1000-19168

Well Diameter 18" Depth of Well 642 1/2' Static Water Level 81.6 Well # and Name Arroyo

Pump Setting 400' Airline Depth _____ Flowmeter: Start 22278.500 End _____

How Q Measured Meter How W.L.s measured Elect. Test Type: Development ✓ StepDraw-Down ___ Production ___

Total Hours This Sheet _____ Person Conducting Well Test Bob Porter / Mark Evans / Justin Rexford.

643'
-370

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
11:03	1.1	2068				1422	Slow Engine + Surge Well 4 X
11:12						1053	Restart well Pump + Increase
11:15		2271				1523	Sand present
11:24		2192					
11:26	1.5	2192	151.8	233.4	14.4	1523	Well Still Making Sand
11:30	1.5		154.95	236.55	14.14	1523	
11:53	1.6	2068	160.3	241.9	12.9	1523	Sand clearing up
11:58							Surge well 4 X
12:06						1524	
1223	1.9	2152	154.4	236	13.9	1529	WATER STILL HAS AIR IN IT
1234	1.9	2152	157.3	238.9	13.9	1529	
1244	1.9	2035	159.3	240.9	12.7	1529	WATERS CLEARED UP
1250							SURGE WELL 4X
12:56						1036	Restart well Pump
102						1524	
112	2.0	2104	153	234.6	13.7	1524	
115		2299				1625	RAISE RPM 100 1625
132	2.2	2444	181	262.6	13.5	1625	
137	5.3 PPM						RAISE RPM 1706
152	2.4	2468	206.4	288'	11.9	1702	Still PRODUCING SAND
205	2.8	2290	208.5	290.1	10.9	1702	LOTS OF AIR IN WATER
2.09	16.3 PPM					1765	RAISE RPM TO 1765
214	7.3 PPM	2310				1765	
2.41	3.3	2406				1765	SAND STILL IN WATER
2:54		2357		277'			

14.19 2577 24.93

SALI

Layne Christensen Co.

Test Pump Data

Customer BATTELLE JPL Date 10-9-10 Job Number 1000-1968

Well Diameter 18 Depth of Well _____ Static Water Level 81.6 Well # and Name ARROYO

Pump Setting 400 Airline Depth _____ Flowmeter: Start 22278 End 23040

How Q Measured METER How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down___ Production___

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
329	3.5	2416	196.3'	277.9	12.30	1765	
332	SHUT	DOWN	TEST	PUMP		762000	GALLONS PUMPED TODAY
	34.8 PPM						
		THE WELL PRODUCES A SMALL AMOUNT OF GASES					
	THE AMOUNT OF AIR INCREASES WITH INCREASE OF FLOW.						
	GAS CAN BE SEEN SEPARATING IN BAKER TANK & CLEAR WELL.						
	NOT FROM FALLING WATER. AFTER SHUT DOWN AIR CAN BE						
	HEARD SEPARATING IN WELL. CURRENTLY HIGHEST STEP IS						
	2600 G.P.M. @ 1770 R.P.M.						

Layne Christensen Co. **Test Pump Data**

Customer BATTELLE J.P.L Date 10-11-10 Job Number 1000-1968

Well Diameter 18" Depth of Well 643 Static Water Level 74' 1" Well # and Name ARROYO

Pump Setting 400' Airline Depth _____ Flowmeter: Start 23040 End _____

How Q Measured METER How W.L.s measured electric Test Type: Development ✓ StepDraw-Down _____ Production _____

Total Hours This Sheet _____ Person Conducting Well Test BOB PORTER, MARK EVANS, JUSTIN REXFORD

TIME	PPM SAND (Tube Removing)	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
845						1019	SURGE WELL 3 TIMES
856							
8:58				130.1		1117	
9:07				132.2		1117	
9:13	.2	1319	59.6	133'7"	22.1	1117	
9:28	.2	1379	60.4	135'	22.6	1117	
9:44							Surge 4 x
9:51						1019	Restart Pump + Bring up to 1524 RPM
9:54						1526	
9:59	.4			201		1526	
10:11	.4	2120	133.4	207.5	15.8	1526	
10:20	.4	2110	136.4	210	15.4	1526	
10:33	.4	2272	137.4	211	16.5	1526	
10:50							Surge well 4 x
10:54						1039	Restart Wellpump Increase/1526 RPM
10:57	.5					1527	
3.5 11:12	.6	2027	135.5	209.6	14.95	1527	Water Clear w/ Air Bubbles In it.
11:30	.7						
11:36	.7	2203	139.9	214	15.74	1527	
11:43							Surge 4 x
11:49							Restart Well Pump
11:54						1761	
18:55 11/3/19 11:57				262'		1761	
12:16	1.4	2405	195.4	269.5	12.3	1761	
1242	1.8	2352	198.3	272.4	11.8	1761	STILL MAKING LOTS OF SAND

2000 gpm well

Layne Christensen Co.

Test Pump Data

Customer BATTELLE Date 10-11-10 Job Number 1000-1968

Well Diameter 18" Depth of Well 643 Static Water Level 74.1 Well # and Name ARROYO WELL

Pump Setting 400' Airline Depth _____ Flowmeter: Start 23040 End 23859

How Q Measured METER How W.L.s measured ELECTRIC Test Type: Development ✓ StepDraw-Down___ Production___

Total Hours This Sheet _____ Person Conducting Well Test BOB PORTER, MARK EVANS, JUSTIN REXFORD

2.4.97

TIME	PPM SAND (Rosum Reading)	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
1:02 PM	1.9	2448	198.9	273	12.30	1761	LOTS OF AIR IN WATER
1:13 PM							SURGE WELL 4 TIMES
1:25						1759	START PUMPING AGAIN
1:44	2.2	2532	193.1	267.2	13.11	1759	STILL CREATING SAND
2:01	2.4	2237	193.5	267.6	11.56	1759	
2:20	2.4	2473	193.7	267.8	12.76	1759	
2:35	2.4	2402	194.6	268.7	12.34	1759	Shut Down & Surge 4 X
2:52							Restart Well Pump
2:59	2.5					1761	
3:14	2.7	2341	184.7	258.8	12.6	1761	
3:30	2.7	2410	188.5	262.5	12.7	1761	
		819000 GALLONS PUMP TODAY					

Layne Christensen Company

Date: 10-12-10 Page 3

Customer: Battelle - JPL Arroyo Well

Job No. 27-1000-1968

Meter 10" x 1000

Static level 74.5 Feet

Airline depth _____ Feet

Hours/Page _____

Total hours _____

G.P.D. _____

Operator: J. Hernandez

Pump at 400

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments	FAU	TSS
9:15		Start			928		23861		
9:25	Trc	1000	105.2	30.7	930	32.57	clr trc Brn SNd 23871		
9:35	clr	900	105.85	31.35	930	28.70	clr No SNd 023880		
		Surge	x3						
9:48		Resume			934		023883		
9:58	trc	1000	105.6	31.1	934	32.15	clr trc SNd 023893		
10:08	clr	1000	105.87	31.37	935	31.87	clr no SNd 023903		
		Surge	x3						
10:29		Resume			1017		023908		
10:39	trc	1166	117.51	43.01	1020	27.10	clr trc SNd 023922		
10:49	clr	1250	118.13	43.63	1040	28.65	clr No SNd 023934.5		
		Surge	x3						
11:02		Resume			1078		023932		
11:12	5.3	1900	123.47	48.97	1086	38.79	clr brn SNd 023951		
11:22	trc	1300	124.66	50.16	1086	25.91	clr trc SNd 023964		
		Surge	x3						
11:37		Resume			1109		023968		
11:47	trc	1400	126.66	52.16	1109	26.84	clr trc SNd 023982		
11:57	clr	1400	129.35	54.85	1122	25.52	clr trc SNd 023996		
		Surge	x3						
12:47		Resume			1237		024010		
12:57	5.3	1600	145.6	71.1	1237	22.50	clr brn SNd 024026		
1:07	trc	1800	150.5	76.0	1309	23.68	clr brn SNd 024044		
		Surge	x3						
1:36		Resume			1337		024052		
1:46	5.3	1900	161.88	87.38	1337	21.74	clr Brn SNd 024071		
1:56	trc	1900	173.15	98.65	1382	19.26	trc SNd 024090		
		Surge	x3						
2:13		Resume			1368		024098		
2:23	5.3	1900	168.12	93.62	1368	20.29	clr brn SNd 024117		
2:33	trc	2000	171.46	96.96	1409	20.62	clr trc SNd 024137		

MAJESTIC PRINT (951) 509-2539

65879

Layne Christensen Company

Date: 10-12-10 Page 4

Customer: Battelle-JPL ARROYO Well

Job No. 27-1000-1968

Meter 10" x 1000

Static level 74.5 Feet

Airline depth _____ Feet

Hours/Page _____

Total hours _____

G.P.D. _____

Operator: J. Hernandez

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments	FAU	TSS
2:33					1409		024137		
		Surge	x3						
2:49		Resume			1432		024145		
2:59	5:3	2000	183.2	108	1432	18.51	clr brn SNd 024165		
3:09	trc	2100	188.66	114.16	1465	18.39	clr brn SNd 024186		
3:33		Resume			1136		024192		
3:43	trc	1400	138	63.5	1138	22.04	clr trc SNd 024206		
3:53	clr	1400	140.3	65.8	1151	21.27	clr no SNd 024220		
4:03	clr	1400	140.73	66.23	1151	21.13	clr no SNd 024234		

Layne Christensen Company

Date: 10-13-10 Page 5

Customer: Battelle-JPL ARROYO Well

Job No. 27- 1000-1968

Meter 10" X 1000

Static level 80.84 Feet

Airline depth _____ Feet

Hours/Page 8hrs

Total hours _____

G.P.D. 974000

Operator: J. Hernandez

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments	FAU	TSS
7:52	3.53	START	Step	#1800	GPM		024244		
8:07	3.53	1866	172.89	92.05	1320	20.27	clr brn SNd 024272		
8:22	trc	1800	175.31	94.47	1323	19.05	clr trc SNd 024299		
8:37	trc	1866	176.74	95.9	1323	19.45	clr trc SNd 024327		
8:52	clr	1833	177.88	97.04	1323	18.88	clr No SNd 024354.5		
9:22	clr	1816	179.71	98.87	1323	18.36	clr no SNd 024409		
9:52	clr	1816	180.46	99.62	1323	18.22	clr no SNd 024463.5		
9:52		Step#	2	2000	Gpm	1430	024463.5		
10:07	trc	2033	198.55	117.71	1433	17.27	clr trc SNd 024494		
10:22	clr	2000	199.68	118.84		16.82	clr No SNd 024524		
10:37		2000	200.53	119.69		16.70	024554		
10:52		2000	201.3	120.46		16.60	024584		
11:22		2000	202.0	121.16		16.50	024614		
11:52	clr	2000	202.95	122.11	1433	16.37	clr No SNd 024674		
11:52		Step#	3	2200	Gpm		024674		
12:07	trc	2133	215.54	134.7	1508	15.83	trc clr 024706		
12:22	clr	2133	217.98	137.14	1508	15.55	clr No SNd 024738		
12:37	clr	2133	219.22	138.38	1511	15.41	024770		
12:52	clr	2200	219.91	139.07	1519	15.81	024803		
1:22	clr	2200	221	140.16	1519	15.69	024869		
1:52	clr	2200	221.25	140.41	1520	15.66	clr No SNd 024935		
1:52		Step	#4	2400	Gpm		024935		
2:07	clr	2200	242.71	161.87	1619	13.59	clr No SNd 024968		
2:22	clr	2333	254.46	173.62	1664	13.43	clr No SNd 025003		
2:37	clr	2400	255.77	174.93	1661	13.71	025039		
2:52	clr	2400	256.85	176.01	1661	13.63	025075		
3:22	clr	2366	258.58	177.74	1659	13.31	025146		
3:52	clr	2400	260.62	179.78	1665	13.34	clr No SNd 025218		

10-14-10
RICKY TRUJILLO

BOB PORTER

BATTELLE - J.P.L. ARROYO WELL

ADDED TIME TO THE DEVELOPEMENT OF THE ARROYO WELL. THE FOLLOWING FIGURES REFLECT THE SUCCESS OF ADDITIONAL TIME SPENT IMPROVING THE SPECIFIC CAPACITY.

DATE	S.L.	P.L.	D.D.	FLOW	S.Y.	REMARK
10-9-10	81.6'	277.9'	196.3'	2416	12.30	30 MIN. RUN
10-11-10	74.1'	262.8'	188.5'	2410	12.7	30 MIN. RUN
10-12-10	74.5'	188.6'	114.1	2100	18.39	20 MIN RUN
10-13-10	80.84'	260.6	179.7	2400	13.34	8 HR. RUN

THE LINER IN THIS WELL IS SCREENED FROM 273' TO 643' @ 2400 WE STILL HAVE 12.4' OF COVERAGE ABOVE THE TOP SCREEN. AIR PRODUCTION AT THE END OF THE STEP TEST IS MINIMAL. WE GAINED 20' OF PUMING LEVEL @ 2400 G.P.M. THE AIR PRODUCTION IS MUCH IMPROVED.

DAVE INDICATED THAT CROSS EFFECT (52 & VENTURA) IS SUBSTANCIAL, THE 24 HOUR CONTINIOUS @ ARROYO WILL GIVE US A BETTER IDEA OF CROSS EFFECT & DESIGN.

2:15 25471800

Layne Christensen Co. BOB 760-250-1375

Test Pump Data

Customer BATTELLE J.P.L. Date 10-18-10 Job Number 1000-1968

Well Diameter 16" Depth of Well 647 1/2' Static Water Level 73.8' Well # and Name ARROYO

Pump Setting 401' Airline Depth _____ Flowmeter: Start 025223000 End _____

How Q Measured Flow Meter How W.L.s measured Electric Test Type: Development___ StepDraw-Down___ Production ✓

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS	
12:10	0	0	0	0	0	0		
12:29		2800					Start Pump	
12:34		2416	156.2	230	15.46	1760		
12:39	TRACE	2331	159.2	233.0	14.64	1760		
12:44	TRACE	2392	161.2	235.0	14.87	1760	47 PSI Back Pressure	
12:59	TRACE	2335	164.2	238.0	14.22	1760	47 PSI BACK PRESSURE	
1:14	TRACE	2350	164.2	238.0	14.00	1760	51 LBS DISC. FAIR AMT AIR ADJ Q	
1:31	—	2323	165.6	239.4	14.02	1760	FAIR AMT AIR.	
1:39	—	2325	166.0	239.8	14.00	1780	52.5 LBS ADJ Q MORE AIR	25391900
2:00	—	2325	165.3'	239.1'	14.06	1780	64 LBS ADJ Q MORE AIR	25437800
2:30	.2cc .88 PPM	2257	159.5'	233.3'	14.15	1780	65 LBS LOT OF AIR	25505500
3:00		2246	160.7	234.5'	13.97	1780	65 LBS DISC. " " "	25572900
3:30	.25 .44 PPM	2237	161.3'	235.1'	13.86	1780	65 LBS " " "	25640000
4:00		2238	161.9'	235.7'	13.82	1780	65 LBS " " "	25707150
4:30	.30 .44 PPM	2240	162.5'	236.3	13.78	1780	65 LBS " " "	25774500
5:00	—	2235	163.2'	237.0	13.69	1780	65 LBS " " "	25841500
5:30	.35 .44 PPM	2230	163.2'	237.0	13.66	1780	65 LBS " " "	25908350
6:00	.40 .88	2228	163.1'	237.1	13.66	1780	BOOSTER DISC. 77 LBS. 49.5 HZ 65 LBS. DISC.	25975200
6:30	.45 .88 PPM	2228	163.8	237.6	13.60	1780	65 LBS DISC.	26042040
7:44	—	2227	165.0	238.8	13.49	"	65 LBS DISC.	26207000
8:44 PM	—	2233	165.8	239.6	13.46	"	65 LBS DISC	26347000
9:46	—	2258	166.1	239.9	13.56	1780	65 LBS DISC.	26487000
10:46	—	2183	166.2	240.0	13.13	1780	65 LBS DISC	26618000
1:46	—	2133	166.4	240.2	12.81	"	65 LBS DISCH.	26746000
2:46	—	2300	167.2	241.0	13.75	1780	65 LBS DIS	26884

Layne Christensen Co. **Test Pump Data**

Customer BATTELLE J.P.L. Date 10-18-10 Job Number 1000-1968

Well Diameter 18" Depth of Well 642.5' Static Water Level 73.8' 10-19-10 Well # and Name ARROYO

Pump Setting 401.0' Airline Depth _____ Flowmeter: Start _____ End _____

How Q Measured McCROMETER How W.L.s measured TRANSDUCER ELECTRIC Test Type: Development___ StepDraw-Down___ Production ✓

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS	
1:48 PM	—	2316	167	240.5	13.81	1780	65 lbs DISC.	27023
2:48	—	2166	168.0	240.8	12.89	"	65 lbs DISCH.	27153
3:48	—	2200	168.0	240.8	13.09	1780	65 lbs DISCHRG	27285
4:48	—	2216	168.1	240.9	13.18	"	65 lbs disch	27418
5:52	—	2250	168.0	240.8	13.39	1780	65 lbs "	27562
7:00	.53 cc. .38 PPM	2222	167.0	240.8'	13.30	1780	65 lbs DIS LOTS OF AIR	27708 800
							AVG SINCE 10-18-10 6:30 PM (2222.3)	
8:00	—	2222	167.1	240.9'	13.29	1780	65 LBS DISCHARGE OF PUMP HAS A LARGE AMT. AIR. AT CLEAR WELL - SMALL AMT.	27840 800
9:00	—	2221	167.2	241.0'	13.28	1780	65.0 LBS	27973 300
10:00	—	2220	167.3	241.1'	13.26	1780	65.0 LBS.	28106 000
11:30		2218	167.6	241.4'	13.23	1780	65 LBS	28305 500
12:30		2218	167.7	241.5	13.22	1780	65 LBS.	28434 000
							3,211,000 GALLONS PUMPED	
							2229.8 G.P.M. AVG. FLO	

Layne Christensen Company

Date: 10-25-10 Page 1

Customer: Battelle ARROYO WELL SPINNER & SAMPLES

Job No. ~~X~~ 1000- 1968

Meter 10" X ~~[illegible]~~ Gallons X 1000 Static level 74.5' Feet

Airline depth _____ Feet

Hours/Page _____

Total hours _____

G.P.D. ~~749600~~ 1

Operator: Mack / Bob

28434,000

Time	P.P.M.	G.P.M.	Pumping Level	Draw-down	Engine R.P.M.	Specific Capacity	Comments	FAU	TSS
11:11	Ø						Start Pump		
11:18			227.5'		1760				
11:39		2242	225.8'	151.30					
12:03		2222	225.8'	151.30			66 psi Back Pressure		
12:16		2222			1760				
1222	.757	2232	228'	153.5			66 psi Back Pressure		
12:28							.1 on Bottom Tester.		
12:35			228.5'						
12:43		2222	229.2'	154.7					
1:00		2222	230'		1760				
1:28		~~2242~~	231.5'	157'					
1:59		2240	232.1'	157.6'	1760				
2:46		2270	234.2	159.7	1760		Lots of Air Being Developed by Well		
3:54			235.3	160.8					
4:28		2242	235.5	161			Flow Checked After 10,000 Gallons		
							Pump Avg. 2242 per minute		
4:30 PM							.2CC Sand Accumulates throughout		
							the Day over 5 hrs. Pumping.		
4:42			~~2263~~	161.3			Shut Down		
4:42 10/18/10	.60 PPM	2263	235.8'	161.3'	1760	14.02	Flow Meter @ End of Day		
	.44 PPM	2230	237.6	163.8'		13.66	29,183,000		
During 24 HR 5 HRS IN					2263	G.P.M. AVG.	331 MINUETS		
	331 MINS								
							749000		
	YIELD HAS IMPROVED SINCE THE 24 HR CONTINIOUS								
	AIR OR GAS IN THE WASTE WATER. SEPARATES AT CLEAR WELL								

.1

PACIFIC SURVEYS

SPINNER
DOWN RUNS
PUMPING CONDITION

Job No.
15567

File No.

Company LAYNE CHRISTENSEN
Well ARROYO
Field ALTADENA
County LOS ANGELES State CA

Location:

GPS:N34o11.860' W118o10.023'

Sec. Twp. Rge.

Other Services:

STOP COUNTS
SPINNER ANALYSIS
SAMPLING

Permanent Datum	G.L.		Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'		K.B.
Drilling Measured From	G.L.			D.F.
				G.L.

Date	10/25/2010		
Run Number	ONE		
Depth Driller	642.5'		
Depth Logger	642.5'		
Bottom Logged Interval	641'		
Top Log Interval	271'		
Pump Set @	260'		
Time Pumping Prior to Survey	1 HOUR		
Pumping Water Level	230'		
Max. Recorded Temp.	N/A		
Pump Rate (GPM)	2222		
Time Well Ready	1:00 PM		
Time Logger on Bottom	1:20 PM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	PORTER		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	272'	642.5'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	18"	N/A	0'	642.5'
Liner				

<< Fold Here >>>

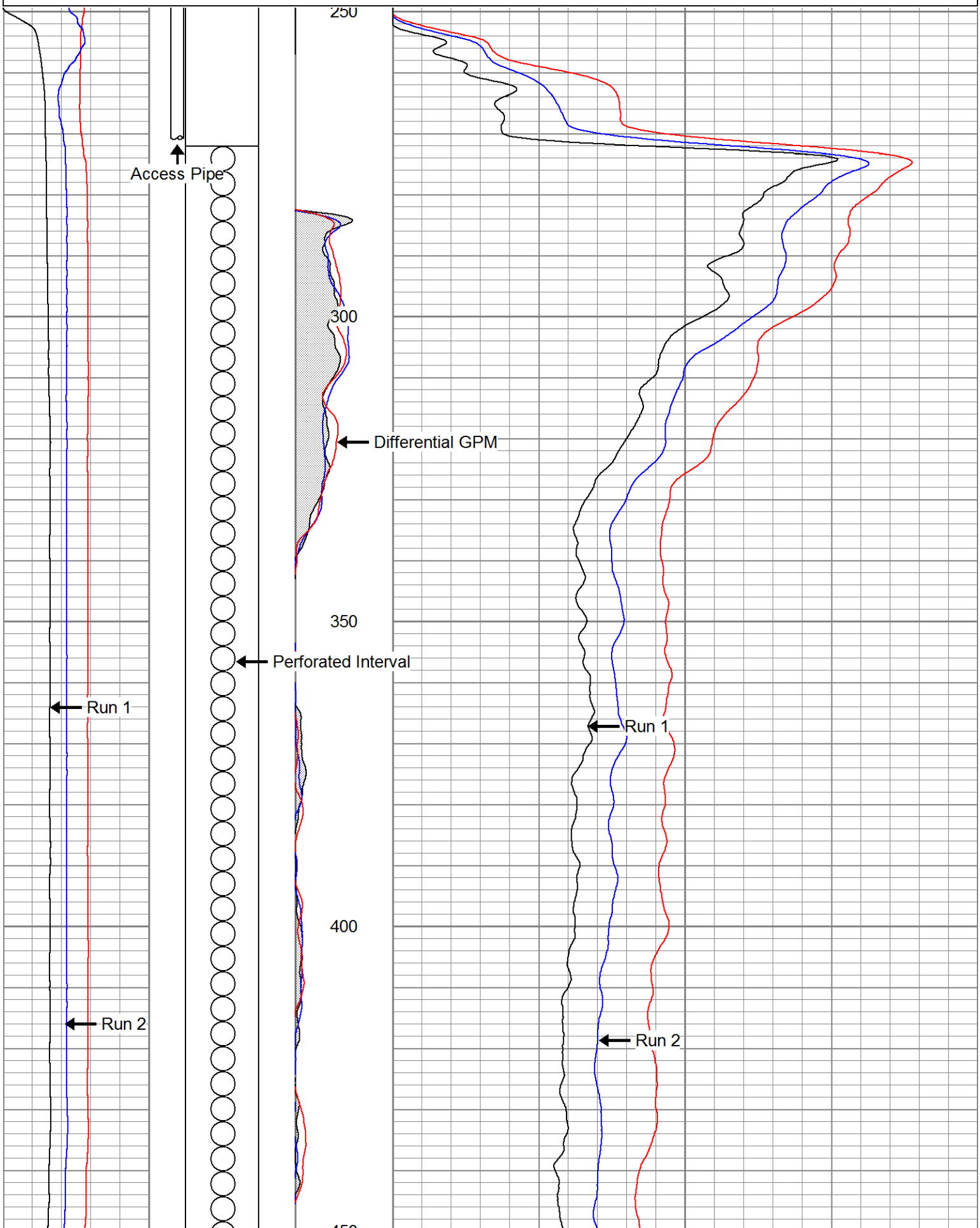
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

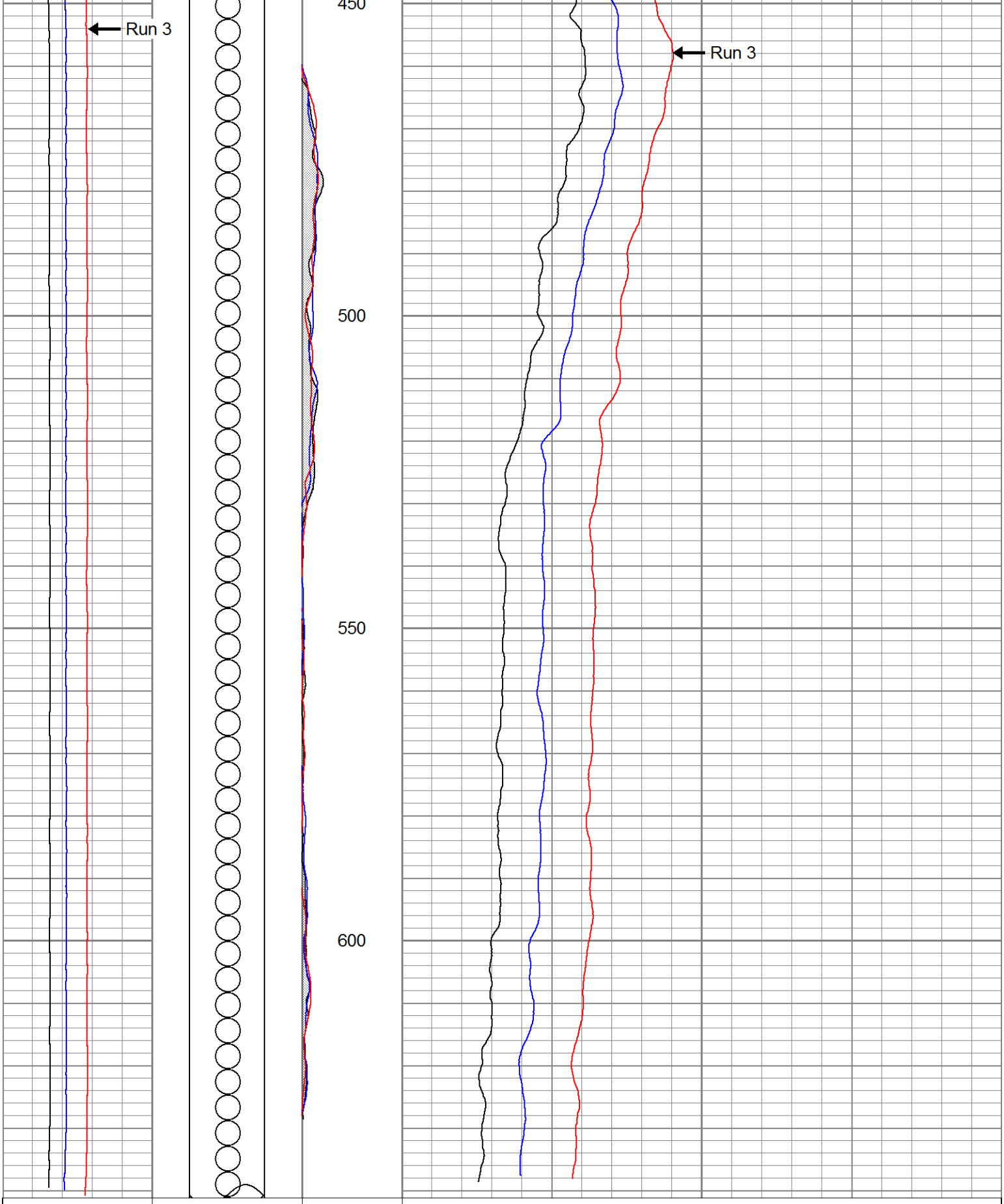
Comments

SAMPLES COLLECTED @ 330', 440', 500', 580'

Database File: 15567.db
Dataset Pathname: SPN2
Presentation Format: spinmerg
Dataset Creation: Mon Oct 25 13:25:53 2010 by Log Open-Cased 090629
Charted by: Depth in Feet scaled 1:240

0	LS (ft/min) 200	CSG SCHDL	Delta Spin	0	Spinner Down Run (cps)	120
0	LS (ft/min) 200		Delta Spin	0	Spinner Down Run (cps)	120
0	LS (ft/min) 200		Delta Spin	0	Spinner Down Run (cps)	120





0	LS (ft/min) 200	CSG SCHDL	Delta Spin	0	Spinner Down Run (cps)	120
0	LS (ft/min) 200		Delta Spin	0	Spinner Down Run (cps)	120
0	LS (ft/min) 200		Delta Spin	0	Spinner Down Run (cps)	120

PACIFIC SURVEYS

SPINNER
STOP COUNTS
PUMPING CONDITION

Job No.
15567

File No.

Company LAYNE CHRISTENSEN
Well ARROYO
Field ALTADENA
County LOS ANGELES State CA

Location:

GPS:N34o11.860' W118o10.023'

Sec. Twp. Rge.

Other Services:

DYNAMIC SPINNER
SPINNER ANALYSIS
SAMPLING

Permanent Datum	G.L.		Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'		K.B.
Drilling Measured From	G.L.			D.F.
				G.L.

Date	10/25/2010		
Run Number	ONE		
Depth Driller	642.5'		
Depth Logger	642.5'		
Bottom Logged Interval	641'		
Top Log Interval	271'		
Pump Set @	260'		
Time Pumping Prior to Survey	1 HOUR		
Pumping Water Level	230'		
Max. Recorded Temp.	N/A		
Pump Rate (GPM)	2222		
Time Well Ready	1:00 PM		
Time Logger on Bottom	1:20 PM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	PORTER		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	272'	642.5'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	18"	N/A	0'	642.5'
Liner				

<< Fold Here >>>

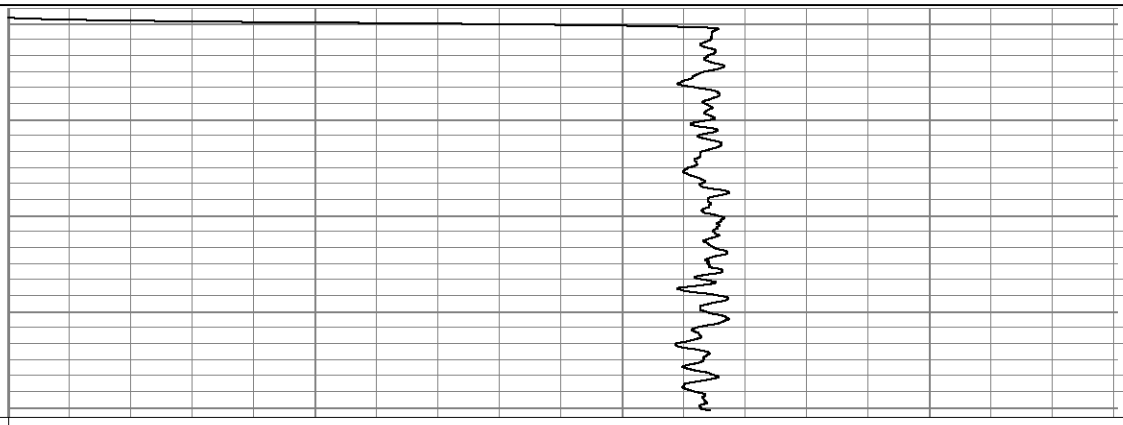
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

Comments

SAMPLES COLLECTED @ 330', 440', 500', 580'

Database File: 15567.db
Dataset Pathname: STOP10
Presentation Format: spnstop
Dataset Creation: Mon Oct 25 14:41:52 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

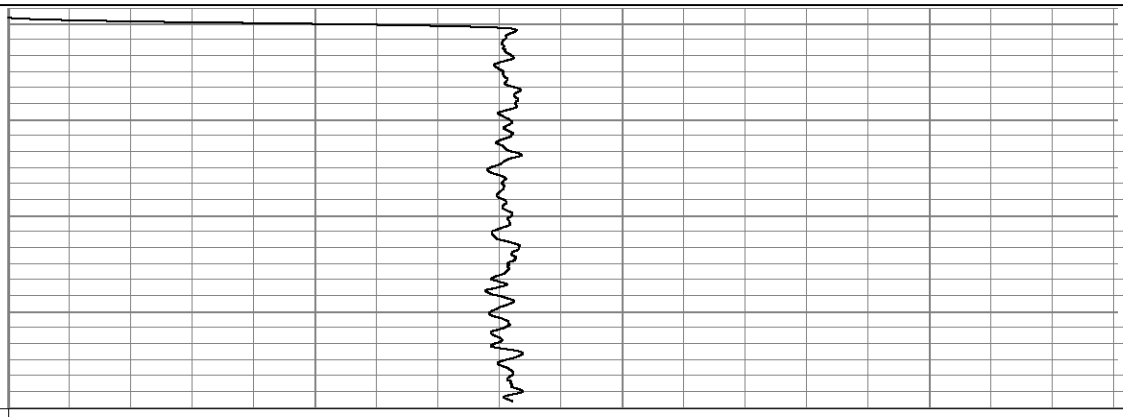
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	280		28.56
			57.02
60	280		57.56
			55.68
120	280		57.57
			56.96
180	280		56.65
			56.71
240	280		56.43



Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

Database File: 15567.db
Dataset Pathname: STOP9
Presentation Format: spnstop
Dataset Creation: Mon Oct 25 14:37:07 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

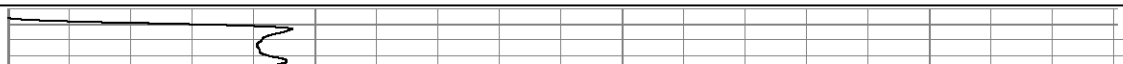
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	300		19.11
			40.34
60	300		40.79
			39.44
120	300		41.06
			40.73
180	300		39.44
			40.87
240	300		

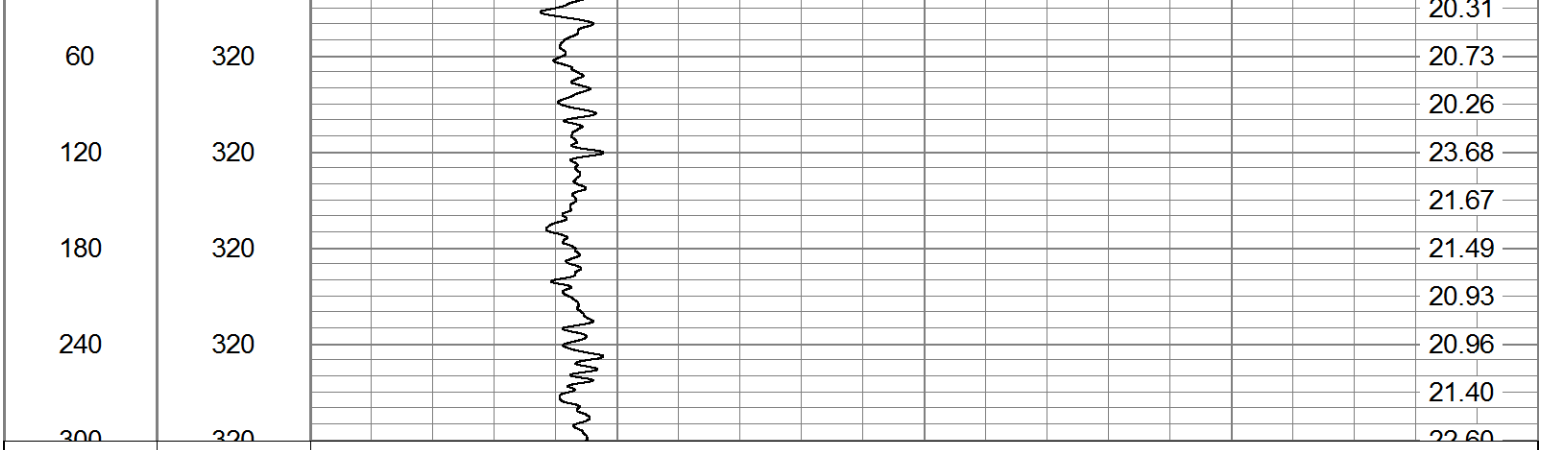


Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

Database File: 15567.db
Dataset Pathname: STOP8
Presentation Format: spnstop
Dataset Creation: Mon Oct 25 14:28:19 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	320		11.42

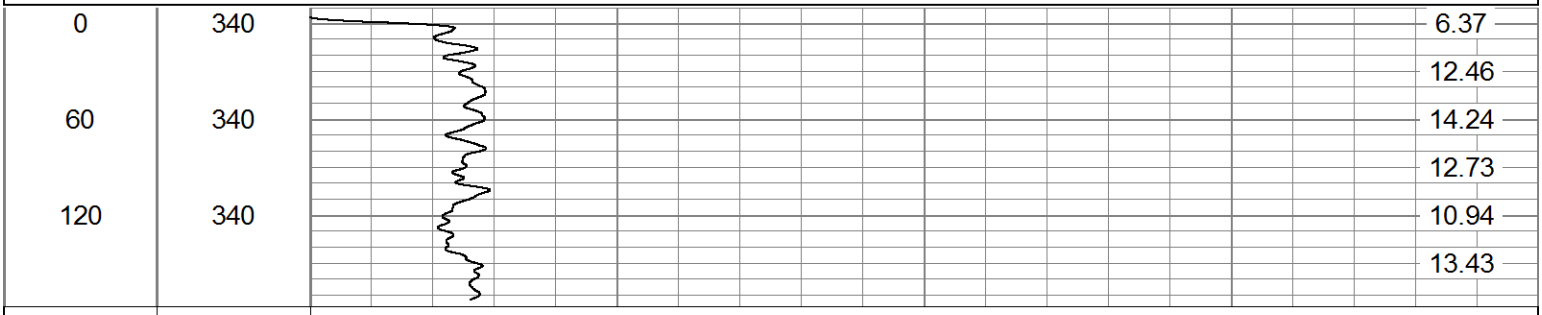




Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

Database File: 15567.db
Dataset Pathname: STOP7
Presentation Format: spnstop
Dataset Creation: Mon Oct 25 14:24:42 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

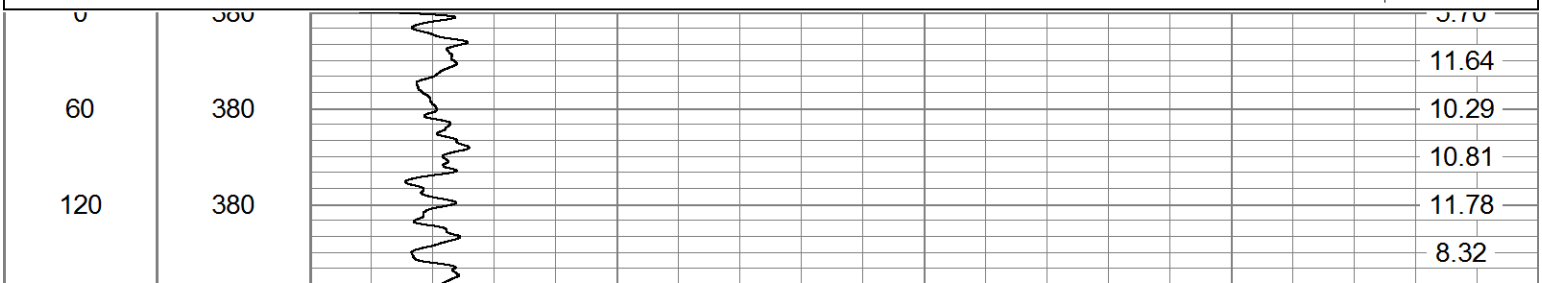
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

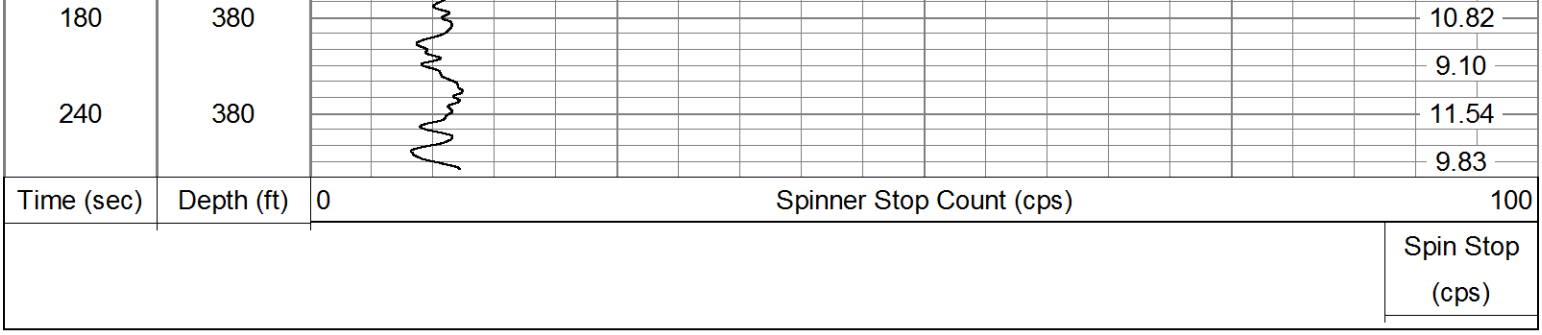


Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

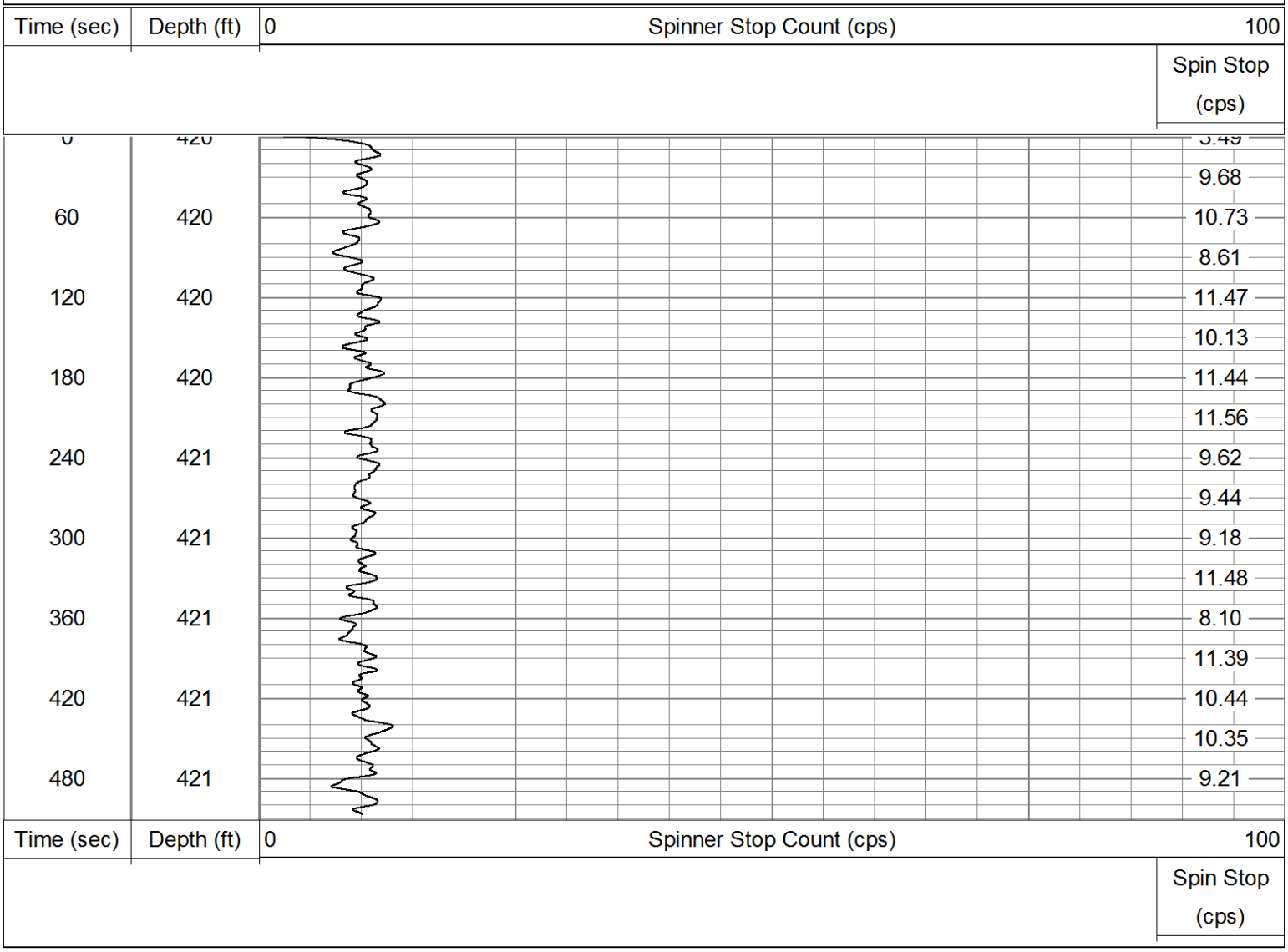
Database File: 15567.db
Dataset Pathname: STOP6
Presentation Format: spnstop
Dataset Creation: Mon Oct 25 14:19:14 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

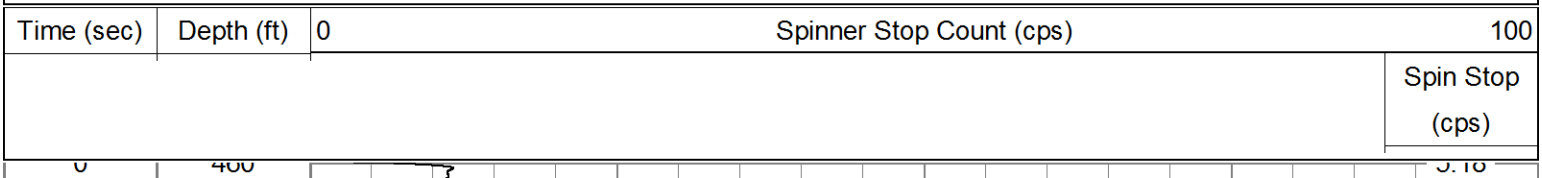


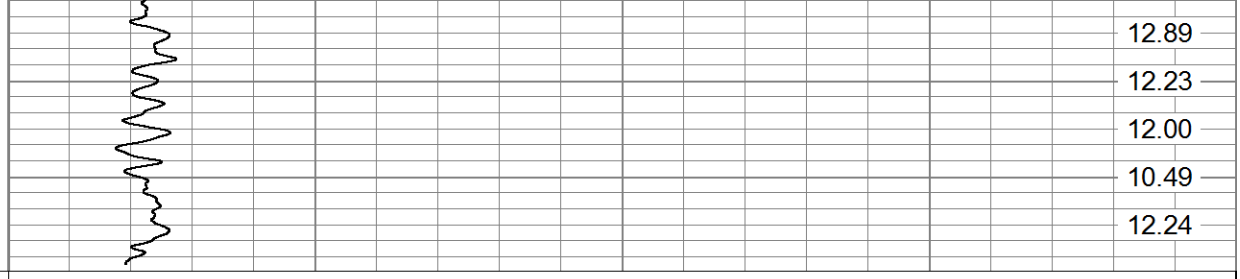


Database File: 15567.db
Dataset Pathname: STOP5
Presentation Format: spnstop
Dataset Creation: Mon Oct 25 14:01:54 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

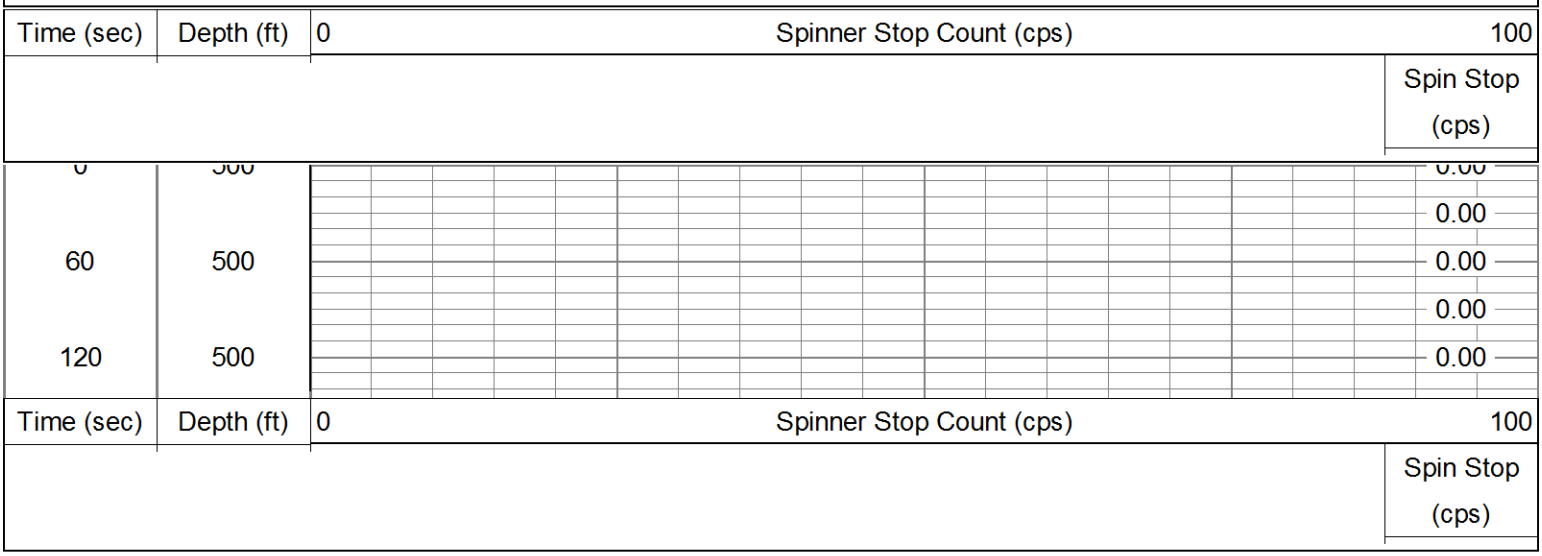


Database File: 15567.db
Dataset Pathname: STOP4
Presentation Format: spnstop
Dataset Creation: Mon Oct 25 13:57:47 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

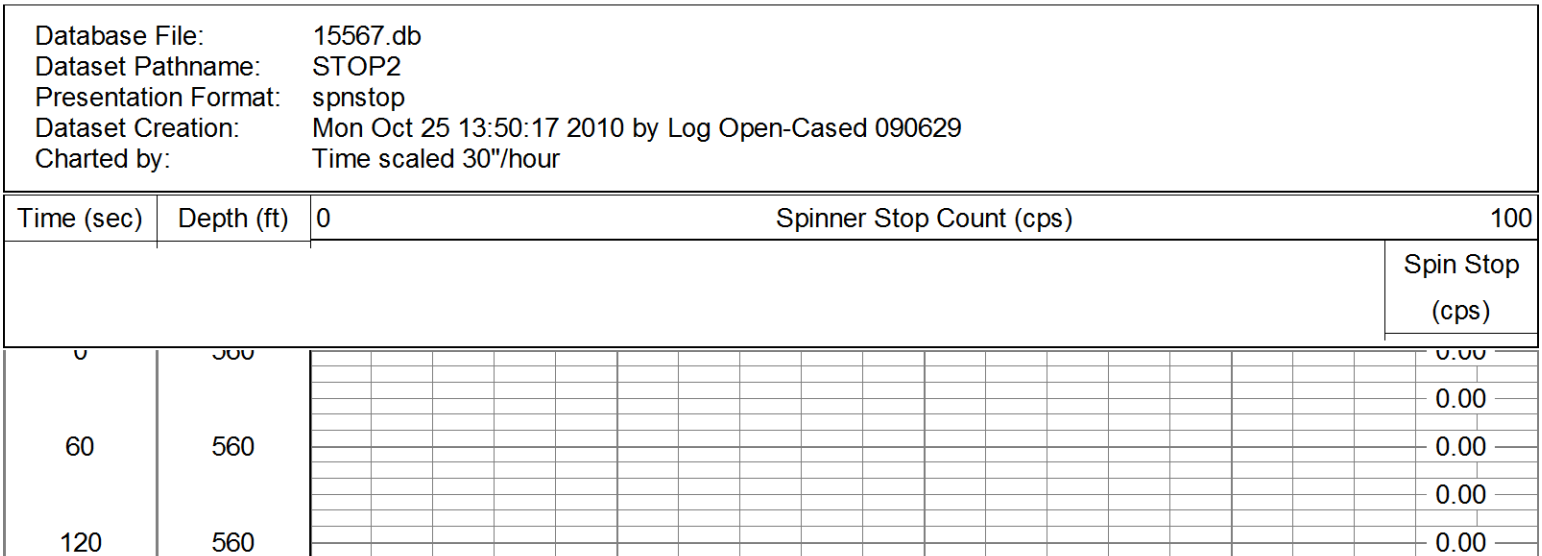




Database File: 15567.db
Dataset Pathname: STOP3
Presentation Format: spnstop
Dataset Creation: Mon Oct 25 13:54:45 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour



Database File: 15567.db
Dataset Pathname: STOP2
Presentation Format: spnstop
Dataset Creation: Mon Oct 25 13:50:17 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour



Database File:	15567.db
Dataset Pathname:	STOP
Presentation Format:	spnstop
Dataset Creation:	Mon Oct 25 13:46:29 2010 by Log Open-Cased 090629
Charted by:	Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	600		0.00
60	601		0.00
120	601		0.00
180	601		0.00

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

PACIFIC SURVEYS

SPINNER
FLUID VELOCITY
SPINNER ANALYSIS
PUMPING CONDITION

Job No.
15567

File No.

Company LAYNE CHRISTENSEN
Well ARROYO
Field ALTADENA
County LOS ANGELES State CA

Location:

GPS:N34o11.860' W118o10.023'

Sec. Twp. Rge.

Other Services:

STOP COUNTS
DYNAMIC SPINNER
SAMPLING

Permanent Datum	G.L.		Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'		K.B.
Drilling Measured From	G.L.			D.F.
				G.L.

Date	10/25/2010		
Run Number	ONE		
Depth Driller	642.5'		
Depth Logger	642.5'		
Bottom Logged Interval	641'		
Top Log Interval	271'		
Pump Set @	260'		
Time Pumping Prior to Survey	1 HOUR		
Pumping Water Level	230'		
Max. Recorded Temp.	N/A		
Pump Rate (GPM)	2222		
Time Well Ready	1:00 PM		
Time Logger on Bottom	1:20 PM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	PORTER		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	272'	642.5'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	18"	N/A	0'	642.5'
Liner				

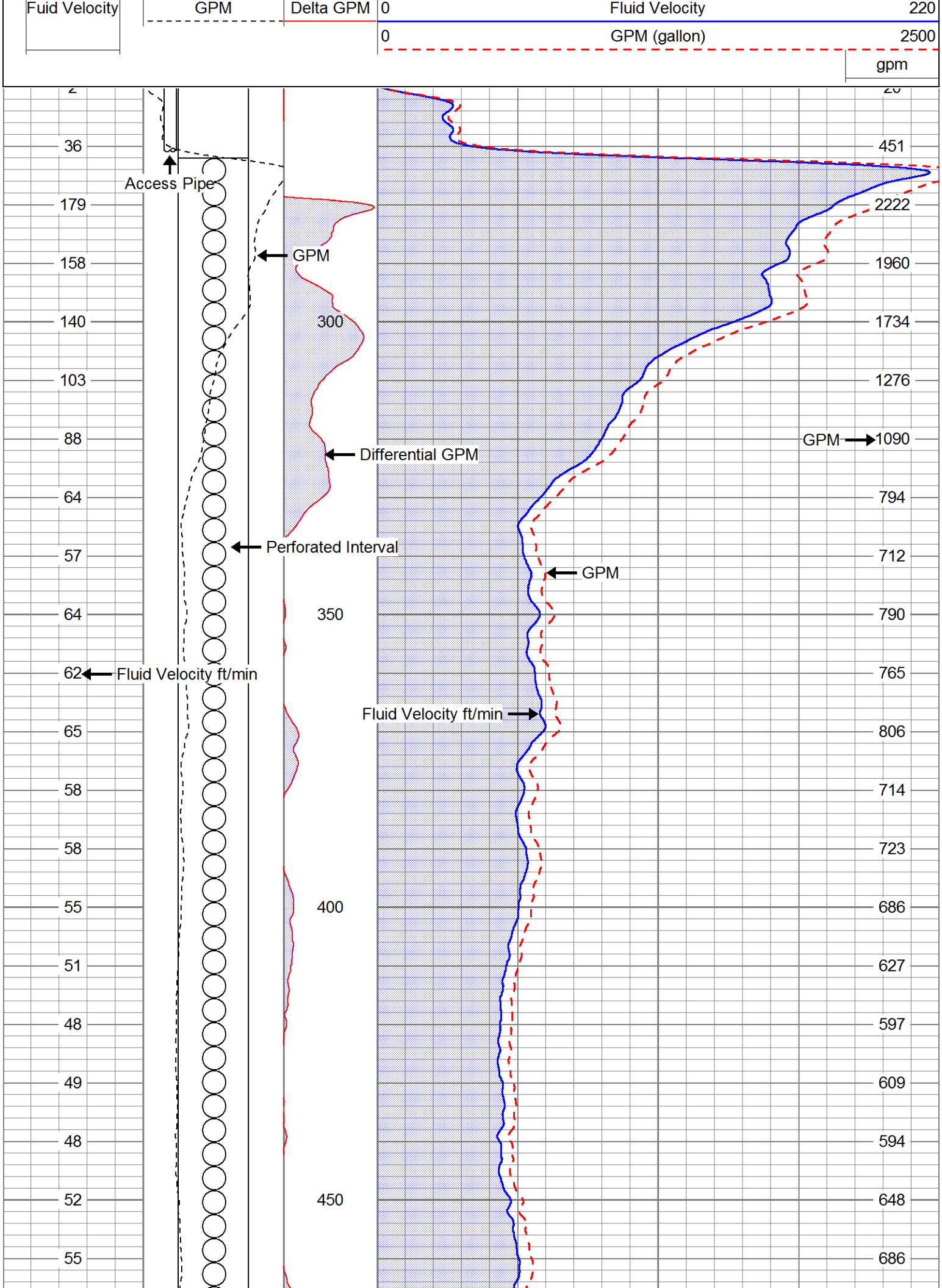
<<< Fold Here >>>

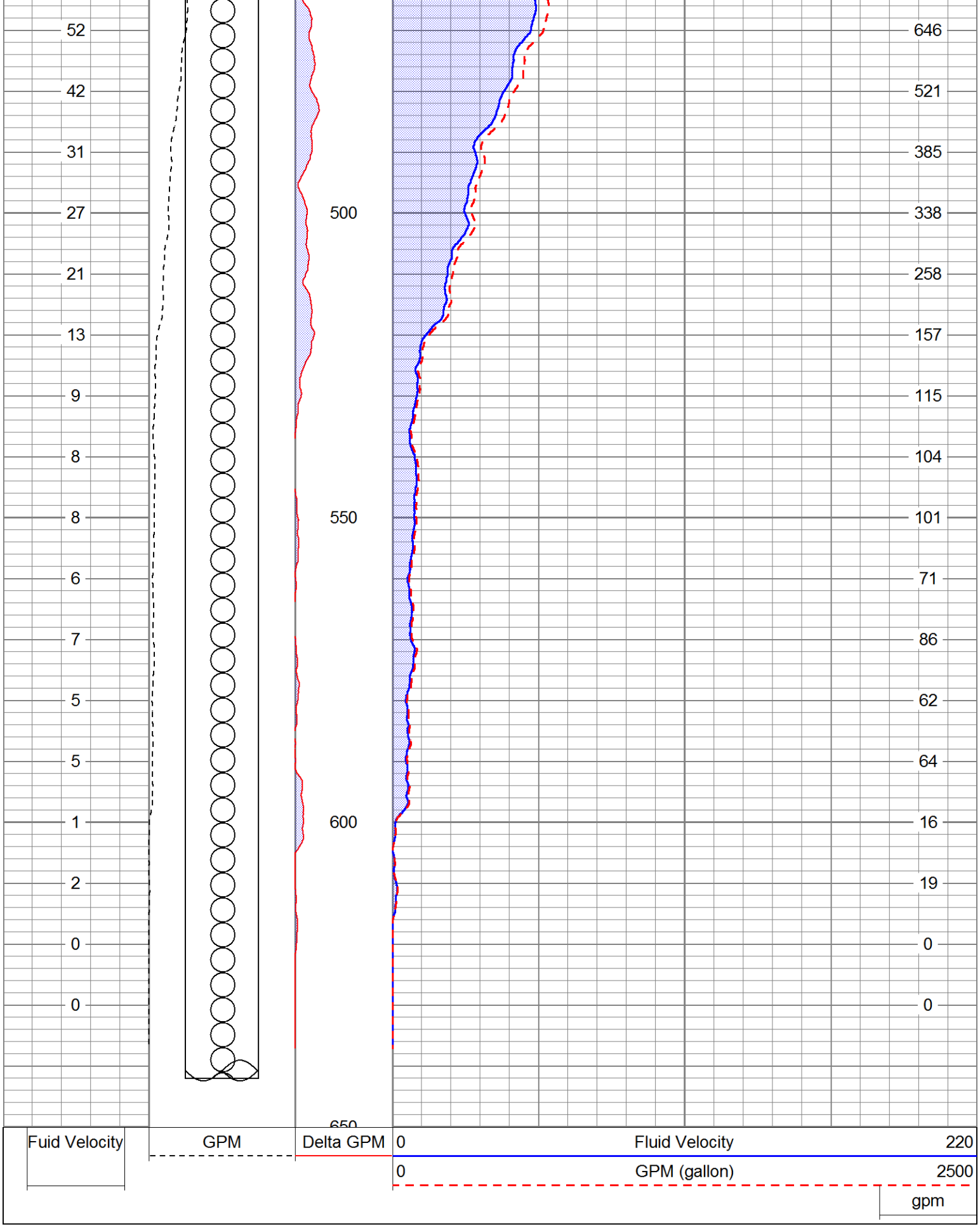
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

Comments

SAMPLES COLLECTED @ 330', 440', 500', 580'

Database File: 15567.db
Dataset Pathname: @00ab4d51
Presentation Format: spinmerg
Dataset Creation: Wed Nov 10 12:38:35 2010
Charted by: Depth in Feet scaled 1:240


Fuid Velocity
GPM
Delta GPM
0
Fluid Velocity
220
0
GPM (gallon)
2500
gpm
Access Pipe
GPM
300
Differential GPM
Perforated Interval
GPM
350
Fluid Velocity ft/min
Fluid Velocity ft/min
400
450
GPM
36
179
158
140
103
88
64
57
64
62
65
58
58
55
51
48
49
48
52
55
451
2222
1960
1734
1276
1090
794
712
790
765
806
714
723
686
627
597
609
594
648
686

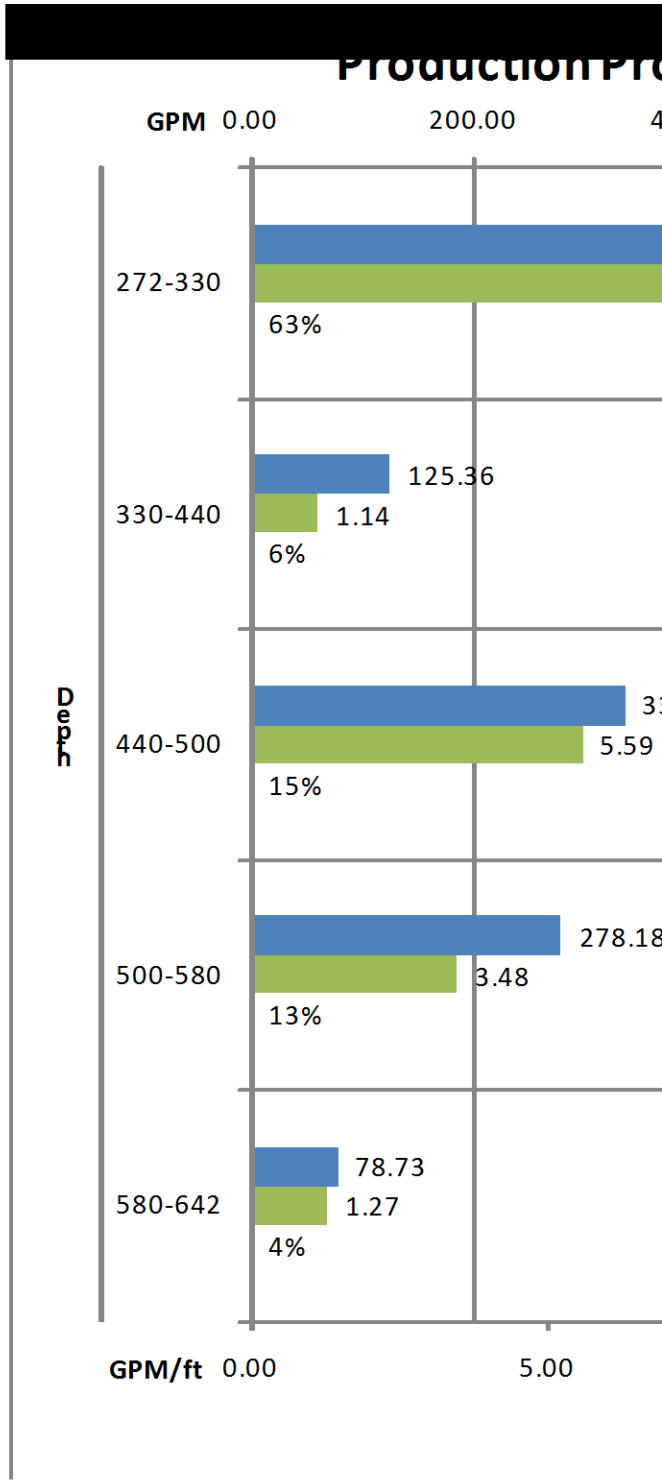

52
42
31
27
21
13
9
8
8
6
7
5
5
1
2
0
0
500
550
600
650
646
521
385
338
258
157
115
104
101
71
86
62
64
16
19
0
0
Fuid Velocity
GPM
Delta GPM
0
Fluid Velocity
220
0
GPM (gallon)
2500
gpm

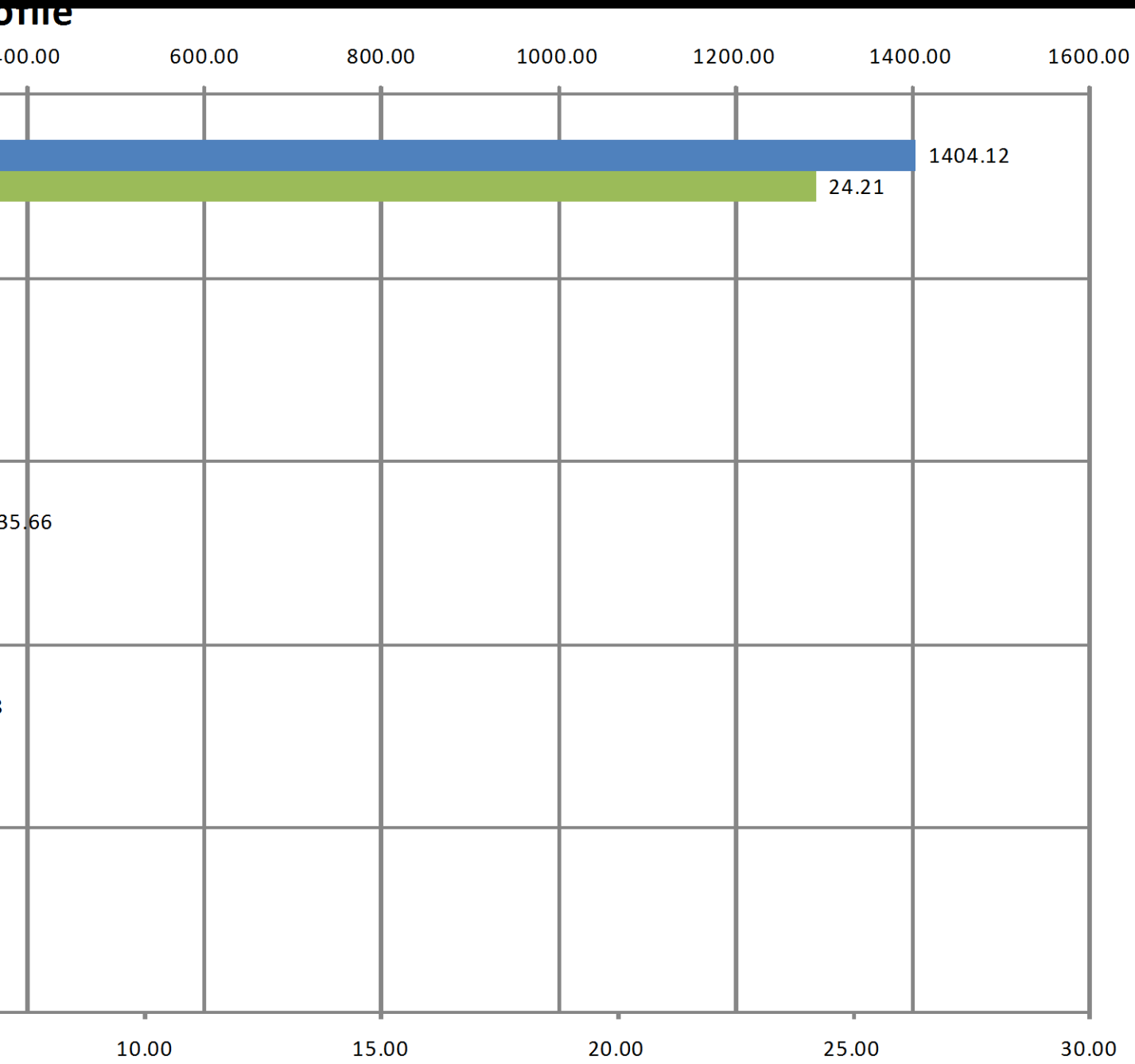
SPINNER LOG ANALYSIS

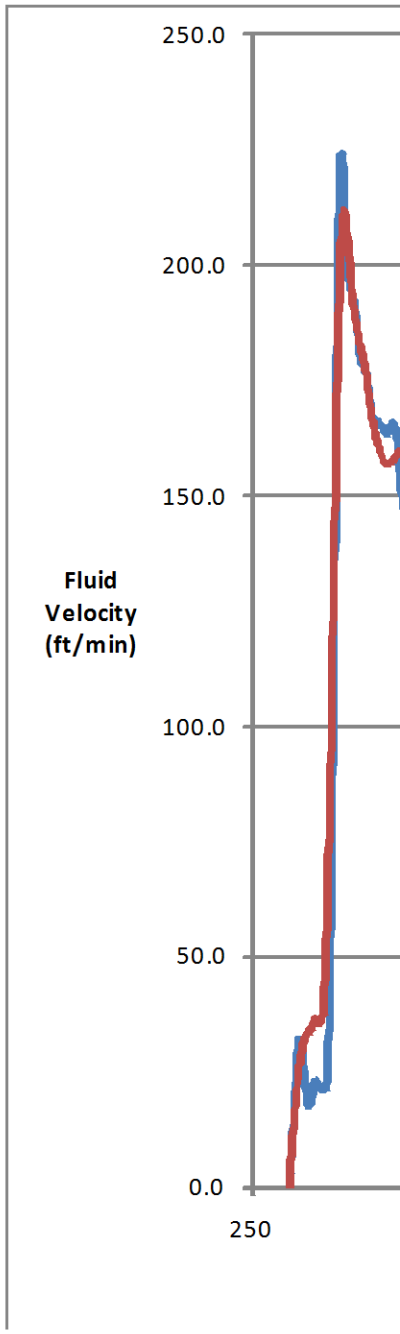
Pacific Surveys

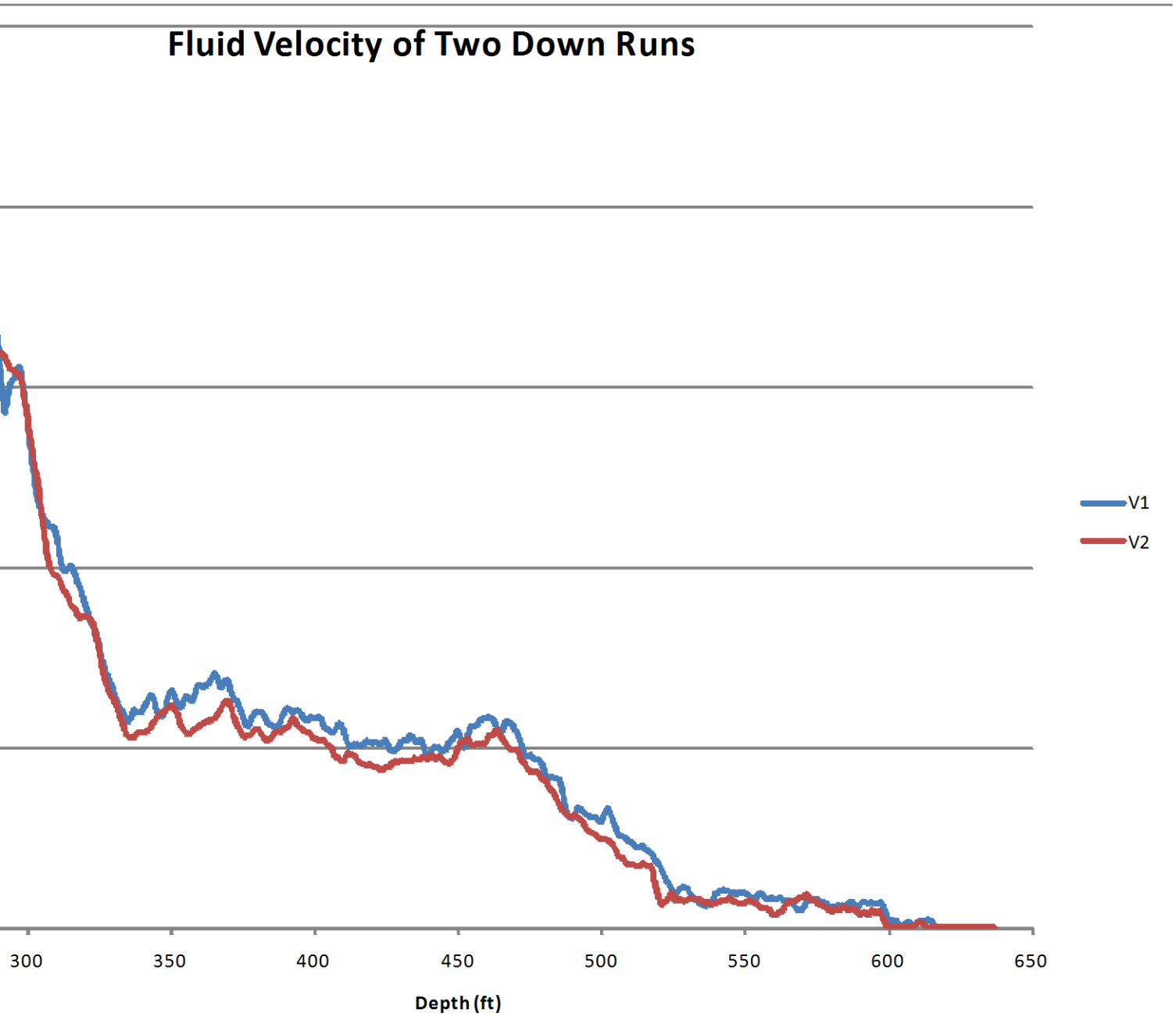
MAX
FLOW RATE 2222.06 GPM

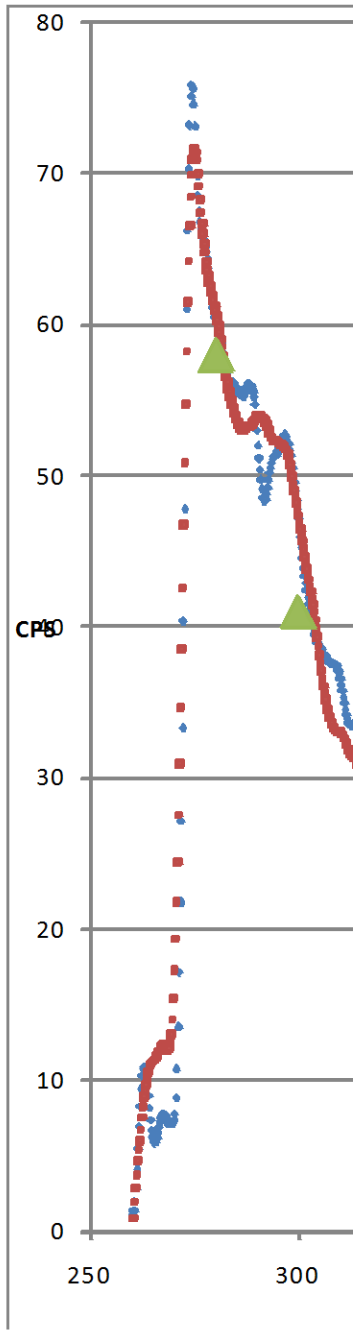
PERFS DEPTHS	PRODUCTION GPM	% OF FLOW ZONES	GPM/FT	THICKNESS ft
272-330	1404.12	63%	24.21	58
330-440	125.36	6%	1.14	110
440-500	335.66	15%	5.59	60
500-580	278.18	13%	3.48	80
580-642	78.73	4%	1.27	62

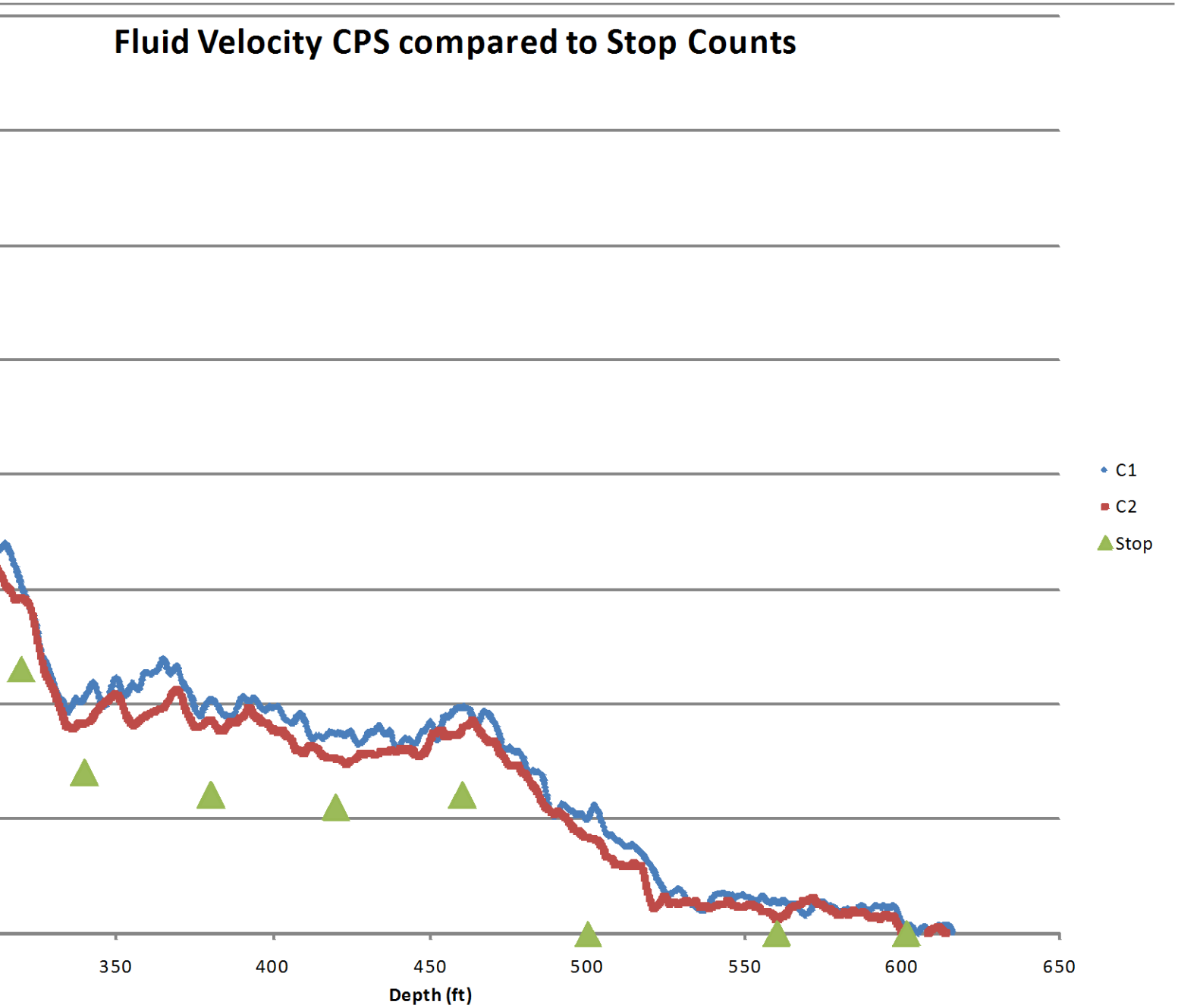


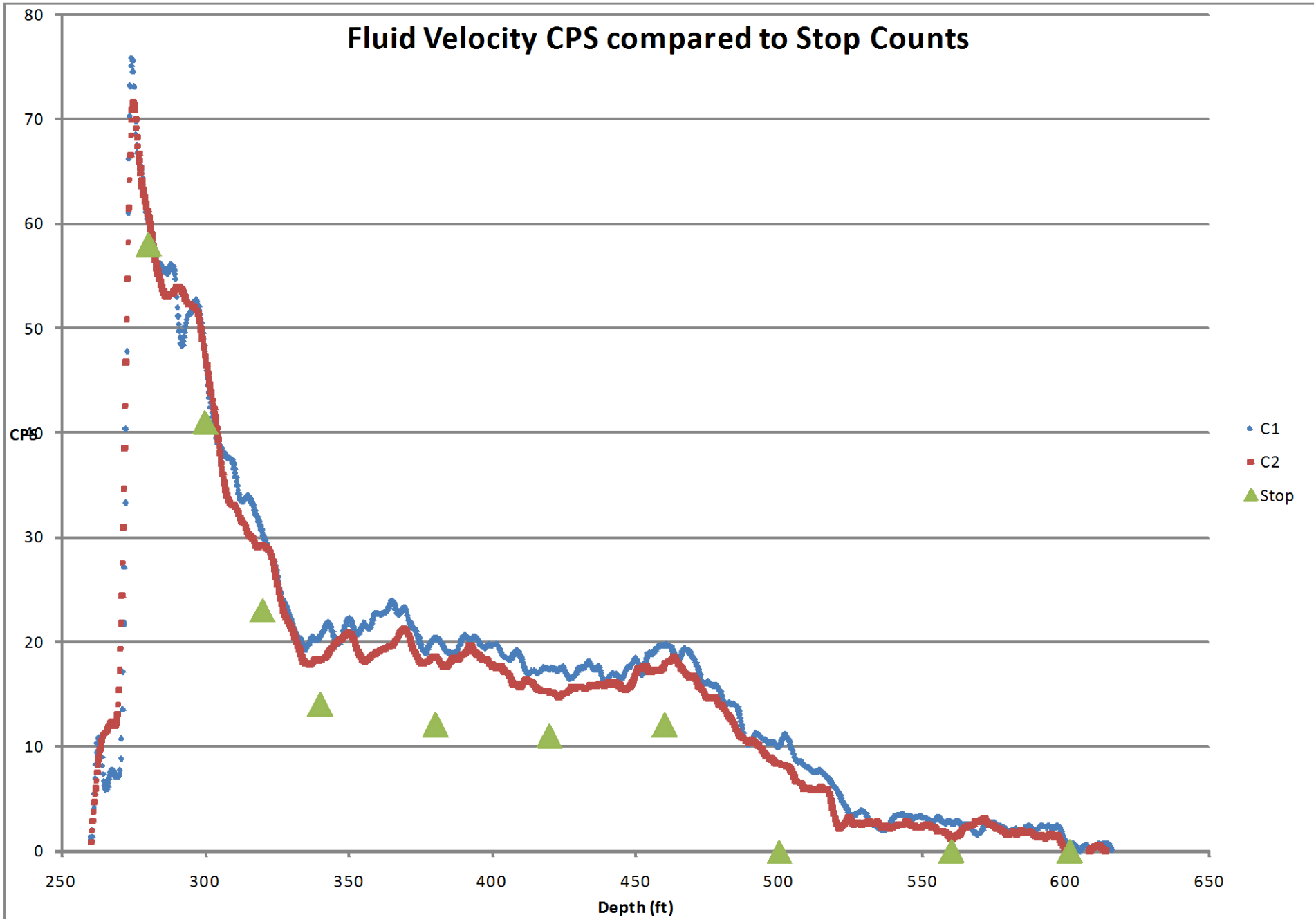

ofile
-00.00
600.00
800.00
1000.00
1200.00
1400.00
1600.00
1404.12
24.21
35.66
10.00
15.00
20.00
25.00
30.00

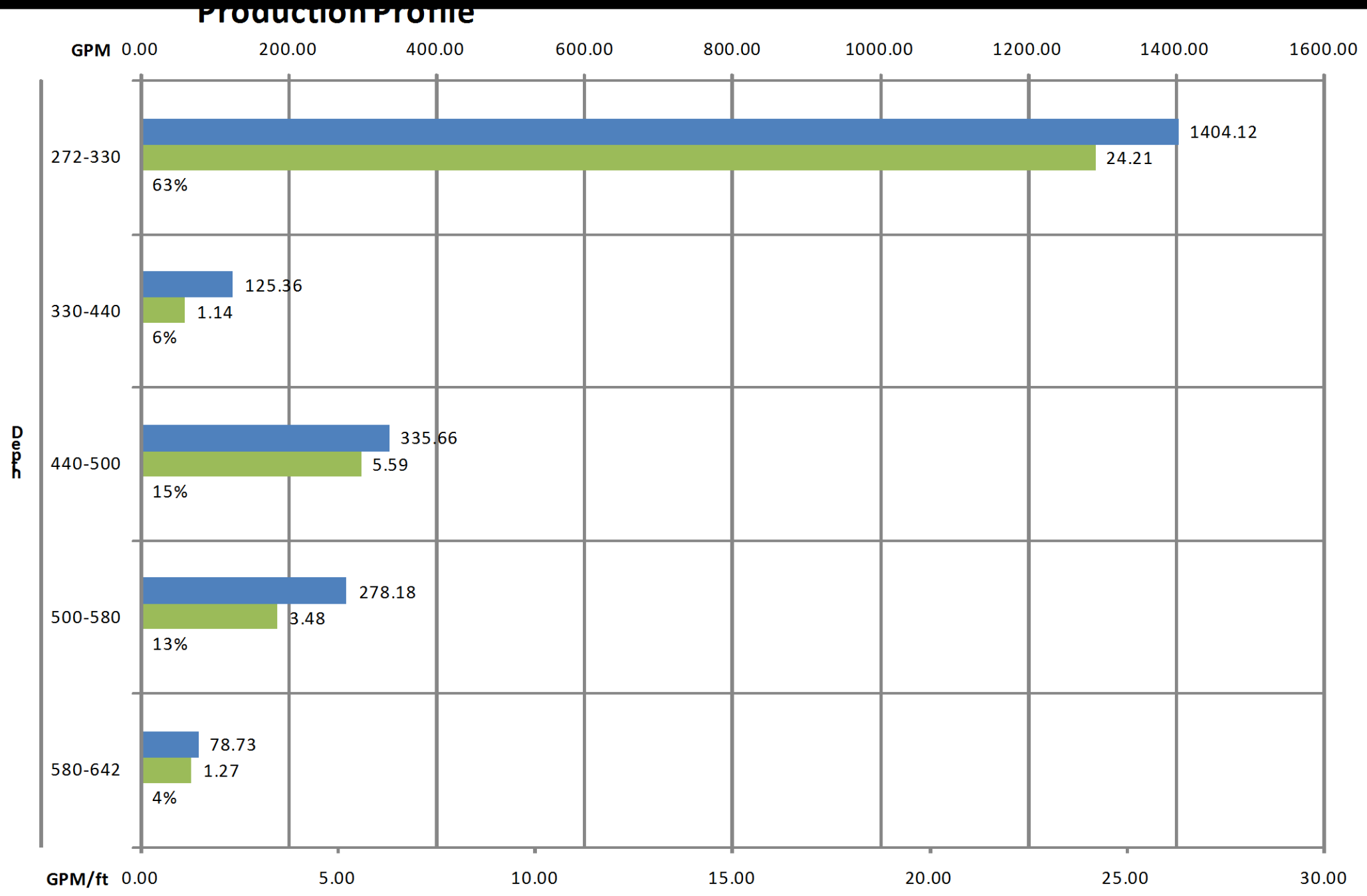

250.0
200.0
150.0
100.0
50.0
0.0
Fluid Velocity (ft/min)
250


Fluid Velocity of Two Down Runs
V1
V2
300
350
400
450
500
550
600
650
Depth (ft)


80
70
60
50
40
30
20
10
0
CPS
250
300


Fluid Velocity CPS compared to Stop Counts
C1
C2
Stop
350
400
450
500
550
600
650
Depth (ft)


Fluid Velocity CPS compared to Stop Counts
CPS
80
70
60
50
40
30
20
10
0
250
300
350
400
450
500
550
600
650
Depth (ft)
C1
C2
Stop

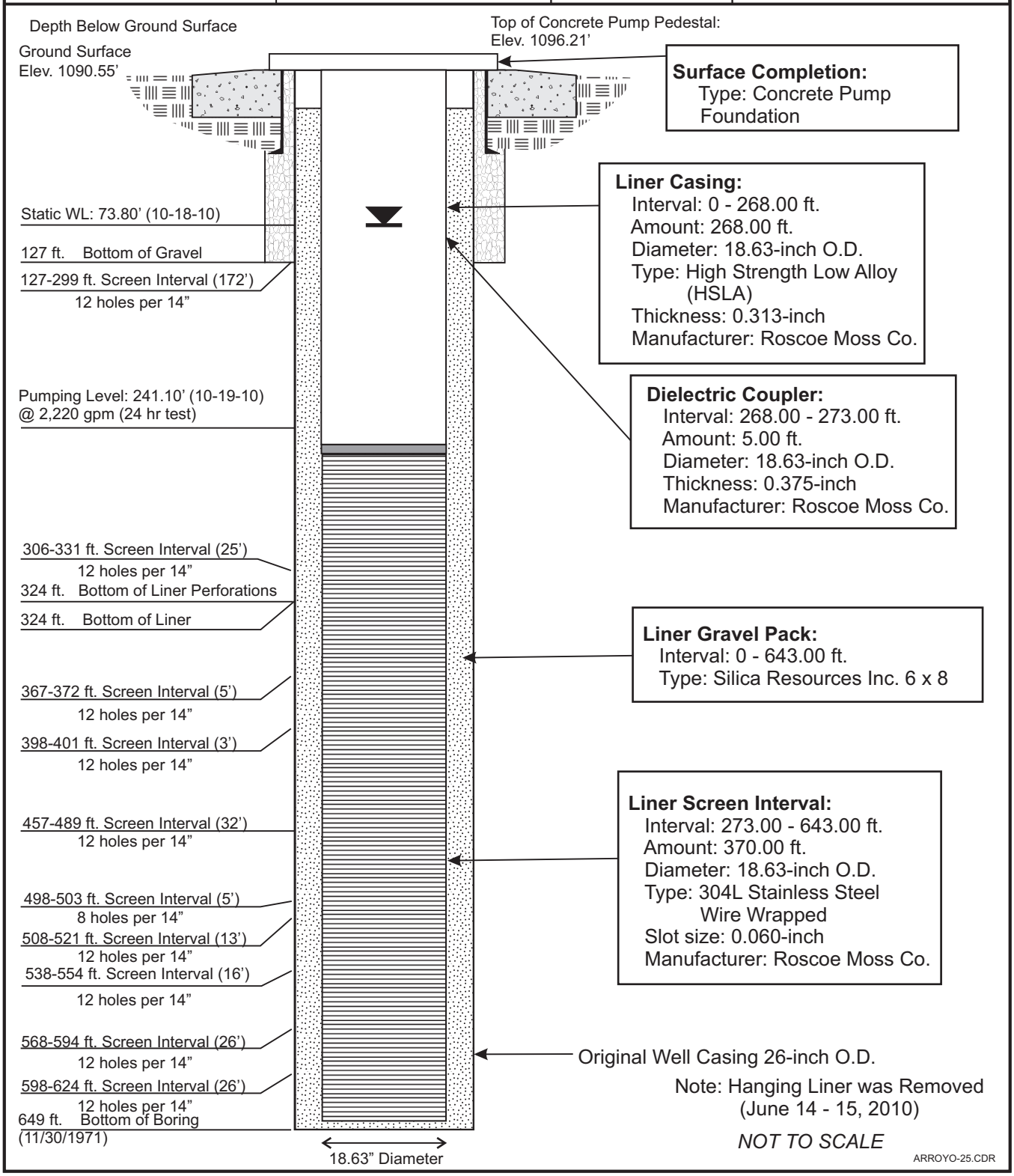

Production Profile
GPM
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
1400.00
1600.00
Depth
272-330
1404.12
24.21
63%
330-440
125.36
1.14
6%
440-500
335.66
5.59
15%
500-580
278.18
3.48
13%
580-642
78.73
1.27
4%
GPM/ft
0.00
5.00
10.00
15.00
20.00
25.00
30.00

APPENDIX 2-25: Arroyo Well Pump Submittal and Liner Diagram

Battelle

Well Liner Diagram
Pasadena, California
ARROYO-25

State Well ID#: 1910124-001	Site: City of Pasadena (MHTS)	Well #: ARROYO-25	Northing: 1894321.855
Rehabilitation Contractor: Layne Christensen	Well/Liner Diameter: 26.00-inch/18.63-inch	Liner Install Dates: 8/9/10 - 8/17/10	Easting: 6511177.610
Reviewed by: C. Shem Hawes	Installer/Welder: M. Evans/G. Frias	Geologist: D. Conner	Surface Elevation: 1090.55'



ESP Turbine Quotation System 8.0.1.44

Pump Performance Datasheet

Customer	: LAYNE CHRISTENSEN/FONTANA	Quote number	: 142640
Customer reference	Battelle Arroyo Well - Pump Curve and data	Item description	: 14RJHC
Item number		Stages	: 5
Service		Based on curve number	: 14RJHC-1770
Quantity	: 1	Date last saved	: 02 Nov 2010 11:34 AM

Operating Conditions

Flow, rated	: 2,200.0 USgpm
Differential head / pressure, rated (requested)	: 350.0 ft
Differential head / pressure, rated (actual)	: 355.1 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 0.998 / 0.998 SG
Viscosity, rated	: 1.00 cP
-	:

Performance

Speed, rated	: 1,770 rpm
Impeller diameter, rated	: 9.00 in
Impeller diameter, maximum	: 9.82 in
Impeller diameter, minimum	: 7.75 in
Efficiency (bowl / pump)	: 83.56 / 81.99 %
NPSH required / margin required	: 31.53 / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 58 / 121 Metric units
MCSF	: 1,200.0 USgpm
Head, maximum, rated diameter	: 468.2 ft
Head rise to shutoff	: 33.78 %
Flow, best eff. point (BEP)	: 2,186.2 USgpm
Flow ratio (rated / BEP)	: 100.63 %
Diameter ratio (rated / max)	: 91.65 %
Head ratio (rated dia / max dia)	: 81.68 %
Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Material

Material requested	: Auto
Material selected	: CI Bowl (Lined) / Std. Brz Impeller

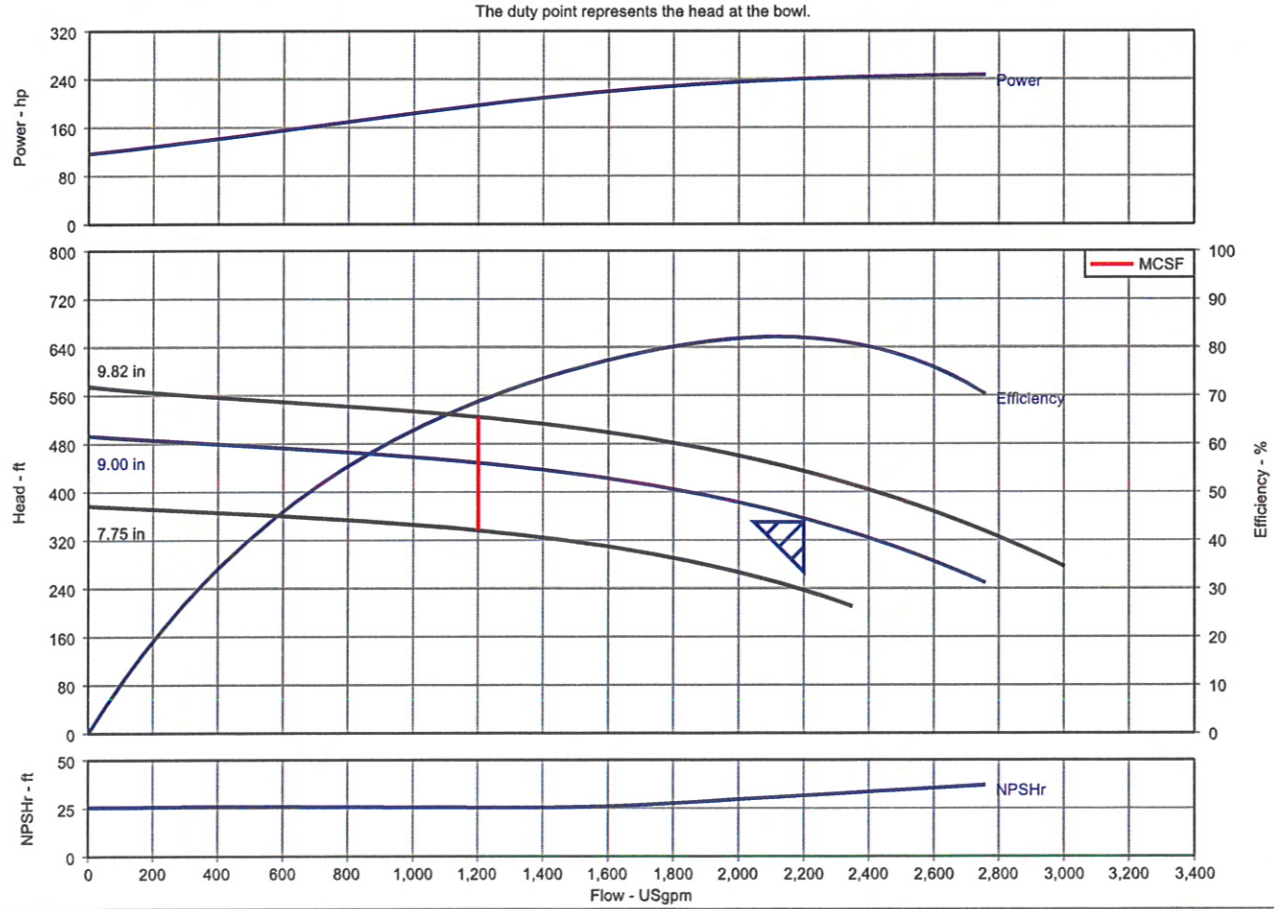
Pressure Data

Maximum working pressure	: 202.6 psi.g
Maximum allowable working pressure	: 420.0 psi.g
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 194 hp
Power (bowl / pump)	: 232 / 241 hp
Power, maximum, rated diameter	: 247 hp
Minimum recommended motor rating	: 250 hp / 186 kW

Pump performance. Adjusted for construction, viscosity, static lift to discharge nozzle centerline, friction and power losses of lineshaft and thrust bearings.
The duty point represents the head at the bowl.

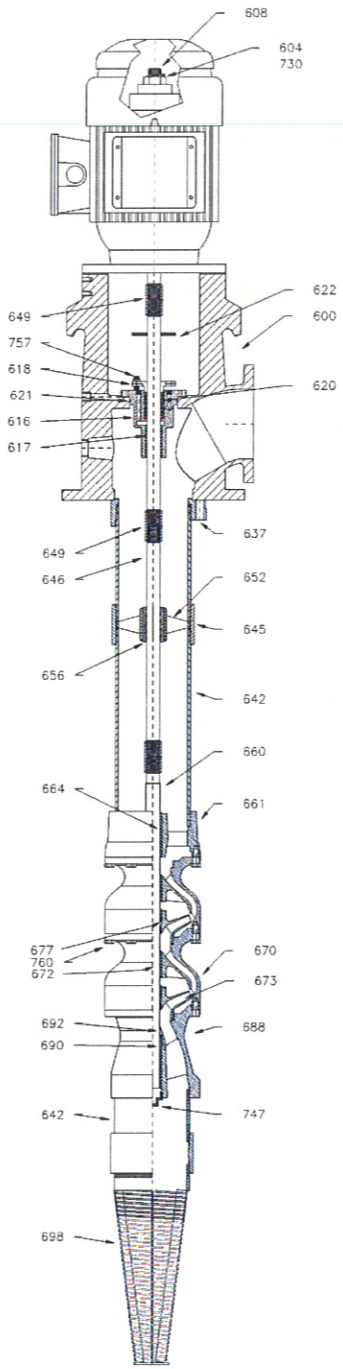


Layne Christensen/ Fontana · 11001 Etiwanda Ave · Fontana, CA 92337
phone: 909-390-2833 · fax: 909-390-6097

ESP Turbine Quotation System 8.0.1.44

Sectional Drawing

Customer	Battelle-Arroyo Well Materials List	Quote number	: 142640
Customer reference		Item description	: 14RJHC
Item number		Stages	: 5
Service		Speed	: 1,770 rpm
Quantity of pumps	: 1	Date last saved	: 02 Nov 2010 12:03 PM



Discharge Head Assembly

ITEM	NAME	CODE	MATERIAL	ASTM
600	Head- Discharge	1003	Cast Iron CL30	A48-94ae1
604	Adjusting Nut	2130	Brass C36000	B16M-00
608	Headshaft	2227	SST 416	A582M-95b
616	Housing	1003	Cast Iron CL30	A48-94ae1
617	Housing bearing	1109	Federalloy Bismuth Bronze	B584-00
618	Split Gland	1002	SST 316	A744M-00
620	Packing	5026	Graphite Packing	ML402-99
621	O-Ring	5302	Nitrile Buna N	D4322-96
637	Top Column Flange	1003	Cast Iron CL30	A48-94ae1
639	Column Lock Ring	1018	Cast Iron CL30	A48-94ae1
649	Lineshaft Coupling	2265	416 SS	A582M-95b
757	Screw- Gland Adjusting	2229	SST 316	A276-00a
779	Gasket- Housing	5136	Acrylic/Nitrile	5136 REV 4

Column And Lineshaft Assembly

ITEM	NAME	CODE	MATERIAL	ASTM
642	Column Pipe	6501	Black Pipe	A 53-98
645	COLUMN FASTENER	Ductile iron		
646	Lineshaft	2227	416 SS	A582M-95b
649	Lineshaft Coupling	2265	416 SS	A582M-95b
652	Retainer- Bearing	Ductile iron		
656	Lineshaft Bearing	5121	Rubber EPDM	D3568-98

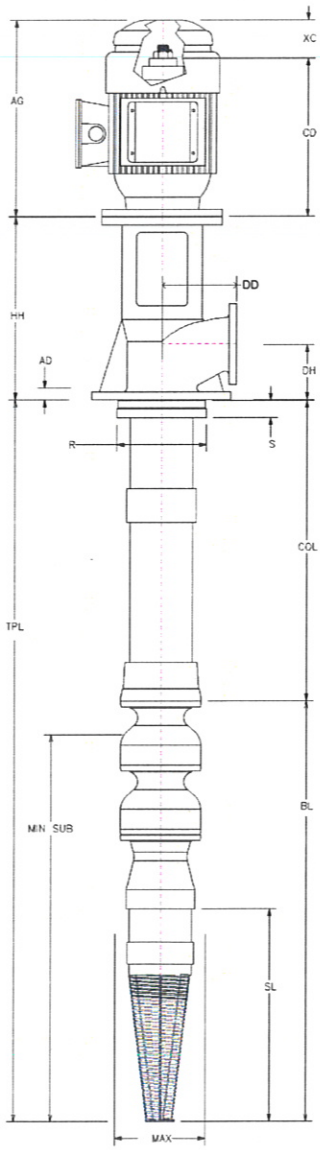
Bowl Assembly

ITEM	NAME	CODE	MATERIAL	ASTM
660	Bowl Shaft	2227	416 SS	A582M-95b
661	Bowl- Discharge	1003	Cast Iron CL30	A48-94ae1
664	Bearing- Disc Bowl	1109	Federalloy Bismuth Bronze	B584-00
670	Bowl - Intermediate	6911	Cast Iron 30 Lined	A48-94e1
672	Bearing- Int. Bowl	1109	Federalloy Bismuth Bronze	B584-00
673	IMPELLER	1102	Silicon Bronze	B584-00
677	Collet	2227	SST 416	A582M-95b
688	Bowl/Bell- Suction	1003	Cast Iron CL30	A48-94ae1
690	Bearing- Suction	1109	Federalloy Bismuth Bronze	B584-00
692	Sandcollar	1205	304 SST	A744M-00
698	Strainer- Suction	6913	SST 316 Xpnd Metal	A555-97
747	Suction Plug	1046	Malleable Iron	A197
760	CAP SCREW	2229	316 ss	A194

ESP Turbine Quotation System 8.0.1.44

Dimensional Outline

Customer	Battelle - Arroyo Well Dimensional Drawing	Quote number	: 142640
Customer reference		Item description	: 14RJHC
Item number		Stages	: 5
Service		Speed	: 1,770 rpm
Quantity of pumps	: 1	Date last saved	: 02 Nov 2010 12:03 PM

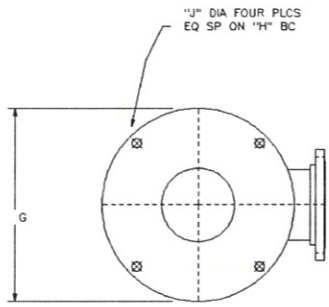


Pump Data

AD	: 1.37 in	Bowl Shaft	: 1.94 in
AG	: 50.06 in		
BD	: 16.50 in	Line Shaft	: 1.94 in
BL	: 191 in	Line Shaft Type	: Open
CD	: 44.78 in	Column Type	: Standard
CL	:	Column	: 10 in. Threaded
COL	: 402.5 ft	Bearing Spacing	: 10.00 ft
	:	Section Length	: 10.00 ft
DD	: 14.69 in	Head Type	: F Cast
MIN SUB	: 177 in	Head Size	: 10 X 16 1/2 CF
MS	:	Flange Rating	: 250#
DH	: 10.56 in		
G	: 25.00 in	Seal	: Packing
H	: 22.75 in	Strainer	: Cone
HH	: 28.25 in	SubBase	: No
J	: 0.75 in		
R	: 14.60 in		
S	: 2.38 in		
SL	: 150 in		
TPL	: 418.4 ft		
UG	:		
V	:		
W	:		
X	:		
XC	: 0.00 in		
Y	:		
Z	:		
	:		
Max Allowable Shaft Elongation	:		
Total Shaft Elongation	: 0.20 in		
MAX	: 13.62 in		

Hydraulic Data

Flow	: 2,200.0 USgpm
TDH (total dynamic head)	: 356.0 ft
	:
Speed	: 1,770 rpm
Fluid	: Fresh Water
Temperature	: 68.00 deg F
Viscosity	: 1.00 cP
Density	: 0.998 SG
SU	: 0.00 in
	:
	:
M (TPI)	: 0
L	: 1.94 in



US Motors RUSI (premium efficient) VHS motor with Non-Reverse ratchet and steady bushing with 9,800 pound thrust bearing

Miscellanious

Thrust at Design	: 7,705.3 lbf
Max Thrust	: 8,885.6 lbf
	:

Weight

Pump	: 24,315.0 lb
Motor	: 1,600.0 lb
Total	: 25,915.0 lb

Motor Data

Model	: HO250V2SLH
Make	: -
HP	: 250
"Nominal" RPM	: 1800
ITT Item No.	: N/A
"Nominal" Efficiency	: 95.8
Frame	: H445TPA
Ratchet	: NRR

Layne Christensen/ Fontana · 11001 Etiwanda Ave · Fontana, CA 92337
phone: 909-390-2833 · fax: 909-390-6097 ·

Water Systems Engineering Inc.
3201 Labette Terrace
P.O. Box 700
Ottawa, KS 66067-0700
Phone: 785-242-6166
Fax: 785-242-9411

WATER TREATMENT ANALYSIS AND CONTROL REPORT

David J. Conner
Battelle Memorial Institute
4800 Oak Grove Drive M/S 180-801
Pasadena, CA 91109

Date: March 30, 2010

Lab Report No. 18415

RE: City of Pasadena, Windsor No.48; Samples dated 3/15/10
Complete Profile (1); P.O. #216906

NA - Not Applicable
ND - Not Detected
*(as $CaCO_3$)

	Windsor No.48		Detection Limits
	147' @ 10:00 mg/l	320' @ 10:10 mg/l	
pH Value	7.89	7.64	NA
Phenolphthalein Alkalinity*	ND	ND	4 mg/L
Total Alkalinity*	180	180	4 mg/L
Hydroxide Alkalinity	ND	ND	4 mg/L
Carbonate Alkalinity	ND	ND	4 mg/L
Bicarbonate Alkalinity	180	180	4 mg/L
Total Dissolved Solids	579	590	1.0 mg/l
Conductivity (µm or µS/cm)	804	820	NA
ORP (mV)	371	374	0.1 mV
Langelier Saturation Index	+ 0.50	+ 0.25	NA
Total Hardness*	336	344	4 mg/L
Carbonate Hardness	180	180	4 mg/L
Non Carbonate Hardness	156	164	4 mg/L
Calcium*	208	208	4 mg/L
Magnesium*	128	136	4 mg/L
Sodium (as Na)	5.93	5.59	5.0 mg/L
Potassium (as K)	2.6	2.4	0.1 mg/L
Chlorides (as Cl)	74.4	71.2	2 mg/L
Nitrate (Nitrogen)	7.3	10.6	0.3 mg/L
Chlorine (as Cl)	ND	ND	0.02 mg/L
Dissolved Iron (as Fe^{2+})	ND	ND	0.02 mg/L
Suspended Iron (as Fe^{3+})	0.78	0.39	0.02 mg/L
Iron Total (as Fe)	0.78	0.39	0.02 mg/l
Iron (resuspended)	3.20	4.25	0.02 mg/l
Copper (as Cu)	ND	ND	0.04 mg/L
Manganese (as Mn)	0.7	0.4	0.1 mg/L
Phosphate (as PO_4)	0.10	0.11	0.06 mg/L
Sulfate (as SO_4)	72	74	2 mg/L
Silica (as SiO_2)	24.8	32.5	1.0 mg/L
Tannin/Lignin	ND	ND	0.1 mg/L
Total Organic Carbon (C)	ND	ND	0.0 mg/L

Bacterial Analysis:

* F = Filtered M = Million	Windsor No.48 147' @ 10:00	 320' @ 10:10
Plate Count (colonies/ml)	15	69
Anaerobic Growth	25%	15%
Sulfate Reducing Bacteria	Negative	Negative
Fe / Mn Oxidizing Bacteria	Positive	Positive
ATP (cells per ml) Initial	933,000 704,000 (F)	1.0 M 750,000 (F)
ATP (cells per ml) 24 hour	1.1 M 782,000 (F)	1.7 M 748,000 (F)
Total Coliform Bacteria	4 / 10 ml	18 / 10 ml
E. coli Coliform Bacteria	Negative	Negative

Bacterial Identification:

147': *Leptothrix, Acinetobacter venetianus*

320': *Gallionella; Leptothrix, Acinetobacter venetianus, Vagococcus fluvialis*

Microscopic Evaluation:

147': Low visible bacterial activity and smaller flagellates, trace of clay, minor number of crystals, moderate iron oxide with low number of Leptothrix.

320': Low visible bacterial activity with smaller flagellates, trace of clay, minor number of crystals, heavy iron oxide with moderate number of Gallionella and trace of Leptothrix.

Observations and Interpretations:

When received in the lab the 147-foot sample was clear and free of sediment. The 320-foot sample contained brown flakes. Inorganic analysis found similar results for both samples with moderate alkalinity and high total hardness as well as high non-carbonate hardness. The samples possessed an elevated pH of 7.89 and 7.64 respectively. The calculated Langlier Saturation Index was positive indicating a reduced corrosion potential groundwater environment and a slightly over saturated condition in relation to the carbonate content. Total dissolved solids were moderately elevated and the oxidation-reduction potential indicates an oxidative environment exists within the well. Metals analysis found metal ion concentrations generally within levels expected in groundwater not impacted by heavy mineralization. Potassium was found to be at an elevated level as was resuspended iron. Resuspended iron is the result of chemically as well as biologically mobilized iron and, in some cases, may be a better indication of total iron present. Chlorides, sulfates, and phosphates were within normal groundwater ranges.

Bacterial analysis found 15 colony forming cells per milliliter in the 147-foot sample. The dominant organism identified, *Acinetobacter venetianus*, is a common nonpathogenic organism found throughout the environment including soil and groundwater and is a prolific "slime" forming organism found in many well environments. The 320-foot sample displayed 69 colony forming cells and in addition to the *Acinetobacter venetianus* also contained *Vagococcus fluvialis*, another common, slime forming organism. Microscopic evaluation also identified vary low to low levels of *Liptorthrix*, an iron and manganese oxidizing organism in both samples, and moderate levels of *Gallionella* in the 320-foot sample.

ATP (adenosine triphosphate) testing, which is a measure of the total cellular material present and is a good indication of overall bacterial populations, was excessive in both samples. After filtering through a 3 micron filter to remove biomass and larger organisms, the count remained well above expected levels. Anticipated ATP levels in a properly functioning well are approximately 40,000 to 60,000. Any count over 100,000 is of concern for biofouling. Anaerobic organisms were found to be present at 25% and 15% of the total population after a 48 hour incubation period in the two samples respectively. No sulfate reducing organisms were identified in either sample. Iron and manganese oxidizing organisms were present in both samples. Although testing for E-coli coliforms was negative for both samples, total coliform testing was positive. The coliform count was more indicative of environmental occurrence, with four cells per 10 milliliters in the 147-foot sample and at 18 cells per 10 milliliters in the 320-foot sample.

Microscopic evaluation found low overall visible bacterial activity with low levels of protozoa (flagellates and amoeba). Moderate to heavy amounts of iron oxide based biofilm were observed as well as light amounts of crystalline material.

Gallionella are a stalked bacterium that utilize iron as an energy source and secrete an iron-oxy-hydroxide byproduct. This secretion is often responsible for accumulations of iron oxide in wells and piping systems. Furthermore, the stalked nature of the bacteria rapidly clogs well screens and pump intakes, reducing flow into and out of wells. The secreted stalks are often shed during cycling of the well, resulting in surges of red water and spikes in total iron readings. *Gallionella* are known to migrate beyond the well system and can foul transmission lines and filter systems. *Gallionella* are a naturally occurring bacteria found in a variety of aquatic environments including aquifers. In addition to fouling concerns, *Gallionella* are a chief form of microbial induced corrosion. In its attachment to iron bearing surfaces, *Gallionella* pits the metal in an effort to secure the iron necessary for energy. All iron bearing structures, including stainless steel, are susceptible to this form of pitting.

The *Gallionella* occurrence is of concern beyond biofouling capability. As accumulations of the iron-oxy-hydroxide stalks build within the well, the base layers tend to dehydrate, resulting in a harder, more dynamic iron oxide scale. These scale accumulations are very effective fouling mechanisms within the well and pump. *Gallionella* infestations typically result in a higher degree of required pump maintenance due to fouling of the intakes and iron oxide accumulations within the pump bowls.

Recommendations:

The high amounts of ATP in both samples indicate heavy bacterial congestion from slime forming organisms in the well. The presence of protozoa may indicate impacts from surface or shallow water. The moderately high anaerobic content is an indication of stagnant or low flow areas in the well. This may be a stagnant zone at the bottom of the well but also may be the result of the well not being actively pumped for several years. This period of inactivity would also contribute to the growth of coliforms under anaerobic conditions.

In consideration of these factors, a well rehabilitation program designed to focus on eliminating or reducing the presence of micro-organisms is recommended.

Before beginning remediation, the well should be inspected for a compromised well seal or surface casing, or other indications of surface water entering the well allowing for the entrance of protozoa.

The process should begin with pulling the pump and thoroughly brushing the inside of the well below the static water level to remove loose rust and any mineral scale that may be present and biofilm build-up within the screened zones, all of which can provide a protective environment for the growth of micro-organisms. After brushing, all loose material should be bailed from the bottom of the well.

After bailing, introduce a solution of 5% phosphoric acid combined with 2% Johnson Screen's NW 310 biodispersant tremied into the screened section and swab or surge for approximately six hours. The acid and biodispersant solution will aid in breaking down the biofilm that surrounds and protects the organisms, allowing for better penetration of the disinfection solution as well as removing any mineral scale present. Leave the solution in the well over night and swab or surge for four hours the following morning before pumping off and disposing of the solution.

Once the well has been effectively purged, disinfection should be carried out utilizing a pH adjusted chlorination at a 300 ppm chlorine level with a targeted pH range of 6.5 to 7.0. The treatment volume of the disinfection solution should be equivalent to 3 times the standing well volume. This larger volume is utilized to flood the borehole with the disinfection solution in order to increase the effectiveness of treatment as well as the effective treatment area. Utilization of a chlorine enhancing chemistry (such as Johnson Screen's NW 410 chlorine enhancer) for pH control is strongly advised to improve the biocidel action of the chlorine.

The disinfection solution should be blended above ground and introduced into the well with agitation to disperse the solution throughout the well volume. Agitation utilizing a single or double disc surge block is recommended over jetting or pump-to-tank surging. Once agitation of the perforated section is complete, allow the solution to remain down-hole overnight. Following this period, begin evacuation of the well from the bottom, working upwards, until a minor residual remains and all debris has been evacuated from the well. At this time, the permanent pump and column pipe can be placed into the well and utilized to purge the remaining chlorine solution from the well.

Once the well is back in service, a pumping schedule should be established where the well is pumped often and for extended periods of time to inhibit anaerobic growth and keep the general bacterial population down.

Based on the submitted well data sheet, the following volumes are necessary for each step of the recommended treatment process:

Rehabilitation		
	Phosphoric (Acid 85% strength)	420 gallons
	NW-310 Biodispersant	190 gallons
	Potable water for blending	3000 gallons
Disinfection		
	Sodium Hypochlorite (12% strength)	40 gallons
	NW-410 Chlorine enhancer	43 gallons
	Potable water for blending	20,000 gallons

Since the well has not been in service since 2002 and no performance data is available, it is not known if the well has been significantly impacted by bacterial growth or mineral scale deposition. As an alternative to a full remediation, putting the well into service in its current condition and closely monitoring specific capacity and bacterial populations may also be a viable approach. If this approach is chosen, begin by heavily pumping the well to waste to purge excessive bacterial growth before putting the well on-line and follow up with quarterly bacterial assessments and close monitoring of drawdown and specific capacity. If specific capacity shows a decline or bacterial populations increase, conduct the remediation described above.

The interpretations and recommendations presented are based on an evaluation of the water samples and submitted data. The recommended treatment is based on laboratory and field evaluations of similar fouling occurrences within potable well systems. Further investigative efforts, such as a pump test, or other evaluation methods may offer additional insight into the well's condition and the degree of fouling.

We appreciate the opportunity to be of service, and, if you have any questions concerning this report, do not hesitate to contact me at 913-707-5926.

Sincerely,

Paul D. Buozis
Professional Geologist

Water Systems Engineering Inc.
3201 Labette Terrace
P.O. Box 700
Ottawa, KS 66067-0700
Phone: 785-242-6166
Fax: 785-242-9411

WATER TREATMENT ANALYSIS AND CONTROL REPORT

David Conner
Battelle
65 West Dayton St.
Pasadena, CA 91105

Date: September 2, 2010

Lab Report No. 18571

Re: City of Pasadena; Windsor No.48; samples dated 8/11/10
Complete Profile (1); P.O. #216906

NA - Not Applicable
ND - Not Detected
*(as $CaCO_3$)

	Well		Detection Limits
	300' 13:00 mg/l	Aquifer 13:40 mg/l	
pH Value	7.21	7.38	NA
Phenolphthalein Alkalinity*	ND	ND	4 mg/L
Total Alkalinity*	164	192	4 mg/L
Hydroxide Alkalinity	ND	ND	4 mg/L
Carbonate Alkalinity	ND	ND	4 mg/L
Bicarbonate Alkalinity	164	192	4 mg/L
Total Dissolved Solids	698	674	1.0 mg/l
Conductivity (µm or µS/cm)	970	936	NA
ORP (mV)	431	431	0.1 mV
Langelier Saturation Index	- 0.19	- 0.02	NA
Total Hardness*	380	372	4 mg/L
Carbonate Hardness	164	192	4 mg/L
Non Carbonate Hardness	216	180	4 mg/L
Calcium*	292	272	4 mg/L
Magnesium*	88	100	4 mg/L
Sodium (as Na)	19.5	18.1	5.0 mg/L
Potassium (as K)	3.2	3.2	0.1 mg/L
Chlorides (as Cl)	103.2	106.8	2 mg/L
Nitrate (Nitrogen)	11.6	ND	0.3 mg/L
Chlorine (as Cl)	ND	ND	0.02 mg/L
Dissolved Iron (as Fe^{2+})	ND	ND	0.02 mg/L
Suspended Iron (as Fe^{3+})	ND	ND	0.02 mg/L
Iron Total (as Fe)	ND	ND	0.02 mg/l
Iron (resuspended)	0.09	0.2	0.02 mg/l
Copper (as Cu)	ND	ND	0.04 mg/L
Manganese (as Mn)	0.9	1.1	0.1 mg/L
Phosphate (as PO_4)	0.4	0.1	0.06 mg/L
Sulfate (as SO_4)	96	88	2 mg/L
Silica (as SiO_2)	33.0	33.4	1.0 mg/L
Tannin/Lignin	0.2	0.1	0.1 mg/L
Total Organic Carbon (C)	ND	ND	0.0 mg/l

Bacterial Analysis:

M = Million F = Filtered	Well 300' 13:00	330' 13:40
Plate Count (colonies/ml)	>1,500	>1,500
Anaerobic Growth	30%	40%
Sulfate Reducing Bacteria	Negative	Negative
Fe / Mn Oxidizing Bacteria	Positive	Positive
ATP (cells per ml) Initial	726,000 509,000 (F)	1.1 M 737,000 (F)
ATP (cells per ml) 24 hour	580,000 378,000 (F)	773,000 686,000 (F)
Total Coliform Bacteria	Negative	Negative
E. coli Coliform Bacteria	Negative	Negative
Bacterial Identification	*Ralstonia eutropha, Ralstonia paucula, Gallionella*	*Pseudomonas aeruginosa, Bacillus specie, Gallionella*

Microscopic Evaluation:

300': Light visible bacterial activity with minor number of small protozoa, low amount of crystals, heavy biofilm, trace of Gallionella.

330': Light to moderate visible bacterial activity with minor number of small protozoa, light to moderate amount of crystals, minor iron oxide with heavy biofilm, trace of Gallionella.

Observations and Interpretations:

When received in the lab both the 300 foot and the 330 foot samples were clear and free of sediment.

The inorganic chemical analysis was consistent with the chemical results from the analysis reported in the WSE report No. 18415, dated March 30, 2010 with moderate alkalinity, high hardness, and high dissolved solids. The non-carbonate hardness level has increased, especially within the 300 foot sample. Typically, this parameter reflects oxide or hydroxide deposit potential. A second significant difference was that the resuspended iron content in the current samples was significantly lower than in the March analysis. Resuspended iron is the result of chemical as well as biologically mobilized iron and is an indication of bacterial activity. Resuspended iron, being lower in this sampling as compared to the previous sampling may be an indication that the rehabilitation process disrupted the bacterial growth and it has not had time to completely reestablish itself.

The bacterial analysis found a high level of bacterial activity with heterotrophic plate counts of over 1,500 colony forming cells per milliliter in both samples. The ATP levels were at or above the levels found in the March analysis indicating extreme bacterial congestion remains within the well. This includes anaerobic growth at 30% and 40% of the total bacterial growth in the 300 foot and 330 foot samples respectively. The organisms identified are non-pathogenic organisms capable of producing considerable amounts of biofilm. Total coliform bacteria as well as E-Coli were not identified in the current samples where they were found to be present in the March samples.

The microscopic evaluation was in line with the previous analysis as well with low to moderate visible bacterial activity, low levels of protozoa, and heavy levels of biofilm observed under the microscope.

Recommendations:

Laboratory analysis indicates that heavy bacterial growth remains within the well including anaerobic growth. Since the well has recently undergone an extensive rehabilitation, it may be that the dislodged (free floating) bacterial population may not have been completely purged from the well. It would be advisable to conduct aggressive pumping of the well to remove as much of the bacterial growth and disrupt anaerobic zones before the populations become re-attached and establish a protective biofilm coating. This should be followed by re-sampling for bacterial analysis to determine if bacterial loads are reduced to an acceptable level or remain high.

If, after aggressively pumping the well, the bacterial load remains high, a follow-up disinfection should be considered. Prior to conducting a follow-up disinfection it would be advisable to review the previous rehabilitation procedures, particularly the disinfection step to see if modifying the procedures would be advisable.

The interpretations and recommendations presented are based on an evaluation of the water samples and submitted data. The recommendations are based on laboratory and field evaluations of similar fouling occurrences within potable well systems. Further investigative efforts, such as a pump test, video survey, or other evaluation methods may offer additional insight into the well's condition and the degree of fouling.

We appreciate the opportunity to be of service, and, if you have any questions concerning this report, do not hesitate to contact me at this number.

Sincerely,
Water Systems Engineering, Inc.

Paul D. Buozis
Professional Geologist

WINDSOR WELL GAL. REMOVED

DATE	GAL.	ACTION+NOTES
2.24.2010	22,700	OPEN-END AIR LIFT @ BTTM.
2.25.2010	25,900	Open-end Air Lift @ Bottom
2.26.2010	30,900	O.E.A.L. @ Bottom
3.8.2010	13,000	O.E.A.L. @ Bottom
3.9.2010	3,000	O.EAL @ Bottom
3.10.2010	9,100	DSAL
3.11.2010	29,900	DSAL 474-553'
3.12.2010	25,100	DSAL 320-450'
3.15.2010	1,000	Transfer from roll-off
3.19.2010	9,200	OEAL bottom
3.22.2010	10,900	OEAL bottom
3.23.2010	5,400	OEAL bottom
3.24.2010	3,400	Transfer from roll-off
4.7.2010	7,600	DSAL 322-342'
4.8.2010	22,500	DSAL 336-510'
4.9.2010	15,400	DSAL 530-587'
4.20.2010	15,800	DSAL 320-385'
4.21.2010	9,600	DSAL 375-425'
4.22.2010	22,200	DSAL 425-525'
4.23.2010	17,000	DSAL 525-593'
4.26.2010	6,100	DSAL 570'-580'
4.27.2010	21,700	DSAL 570'-580'

→ FINISHED w/ WINDSOR WELL

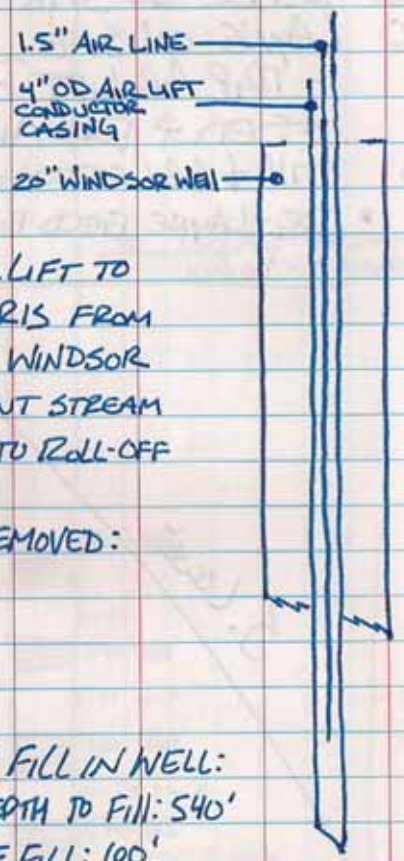
WINDSOR WELL REHAB

22 FEB 2010

- 1045 LAYNE ON-SITE @ WINDSOR WELL, START TO MOBE SLAB, BAIL WELL
- 1330 STEVE S. ON-SITE TO CHECK ON PROGRESS – NOT TOO MUCH TO SEE RIGHT NOW FOR HIM
- 1330 LAYNE START BAILING OFF THE BTTM. OF WELL
- 1530 LAYNE DONE FOR DAY
  *SED. SMPL. COLLECTED FOR GRAIN SIZE ANAL.

S. Lowe

OPEN-END AIRLIFT



① OPEN-END AIRLIFT TO REMOVE DEBRIS FROM THE BTTM. OF WINDSOR WELL. EFFLUENT STREAM DIRECTED INTO ROLL-OFF

② GAL. H_2O REMOVED:

→ VOLUME OF FILL IN WELL:
- TD: 600' · DEPTH TO FILL: 540'
- HEIGHT (H) OF FILL: 60'

* $V = \pi r^2 H$
- $V = x$
- $r = 1.67' \div 2 \simeq 0.83'$
- $H = 60'$

$V = \pi(0.83)^2(60)$
$V = \pi(0.69)(60)$
$V = \pi(41.67)$
$V \simeq 130.88\ ft^3$
(978.98 gal)

WINDSOR WELL REHAB

24 FEB 2010 (WED)

·0700 SL, DC, LAYNE ON-SITE
· PREP TO START OPEN-END AIR LIFT

·0720 · START OPEN-END AIR LIFT @ BTTM. OF WELL IN ORDER TO REMOVE DEBRIS

* NO TOTALIZER ON OUR HOLDING SYSTEM - RAIN FOR RENT HAD BEEN ASKED TO PROVIDE HOWEVER IT WAS NOT DELIVERED. WE WILL HAVE ONE ON-SITE ASAP BUT H_2O TRANSFER VOLUMES WILL BE APROX. UNTIL THEN & THE VOL. REMOVED NOW WILL BE MINIMAL ANYHOW.

·0750 · FAIRLY TURBID H_2O LIFTED FROM WELL
→ VOL. OF ROLL-OFF: 5,500 gal

·0850 · V. TURBIN H_2O LIFTED FROM WELL - H_2O HAS A RUST/DEEP BROWN (MILK CHOCOLATE COLOR)

* VOLUME OF DEBRIS FILL TO BE REMOVED FROM WELL $\simeq 130.88\ ft^3 \simeq 978.98$ gal
$1\ ft^3 = 7.48$ gal

· $130.88\ ft^3 \times \frac{7.48\ gal}{1\ ft^3} = 978.98$ gal (DEBRIS)

* Whisperwatt Generator: 4213 hours

TOTALIZER LOG

DATE	START	END	NOTES
2-24	9,679	9,726	9,679 = Ø; ADD 18,000 gal FROM ROLL-OFF VOL B4 TOTALIZER
2-25	9,726	9,985	
2-26	9,985	10,294	
3-8	10,294	10,424	
3-9	10,424	10,454	
3-10	10,454		

24 FEB 2010 (CONT.)

·0915 ·EMPTY 1ST ROLL-OFF; START W/ FULL: ~5,000 gal; END W/: ~500 gal

① *TOTAL VOL (1ST TRANSFER): ~4,500 gal

② ~4,500 gal
③ ~4,500 gal
④ ~4,500 gal
} TURBID (V. TURBID)

* → TOTALIZER ON-SITE:
!! 9,679 × 100 gal = Ø
∴ THE OPEN-END AIR LIFT FOR 2-24-2010 WILL BE 18,000 gal + TOTALIZER COUNT.

·1425 ·STILL TURBID H_2O - HAVE REMOVED ~10' DEBRIS FROM WELL

·1430 ·START MOVEING H_2O FROM TANK #1 - BAG FILTER - TANK #2 - TANK #3
→ THE TANKS ARE ~½ FULL to 2/5 FULL @ THIS TIME

·1630 ·DONE FOR DAY. RAW-4-RENT TANK #2 LEAKED, RYAN (RAW-4-RENT) ON-SITE + WILL FIX 1ST THING TOMORROW + DELIVER ANOTHER TANK.

* 1ST TOTAL. READING: 9,679
* 2nd (FINAL) TOTAL. READING: 9,726
} 47

47 × 100 = 4,700 + 18,000 = 22,700 gal TOTAL

DCorner

25 Feb 2010

07:00 Layne onsite - waiting for R4R to fix leaking door/hatch on side

08:45 R4R onsite
pulls tank & completes repair (i.e. replaces gasket)

10:00 R4R places 3rd 21K tank

10:15 meet w/ Ron & Rick Trujillo
visit Arroyo, well 52, & Ventura well sites

11:00 Resume pumping open-ended airlift to clean bottom of well

11:30 R4R offsite

17:00 Layne shuts down rig
David Loera & Scott Lowe collected sample for VOCs, Perch, & Total Chrome

Day Start: 972,600
Day Finish: 998,500

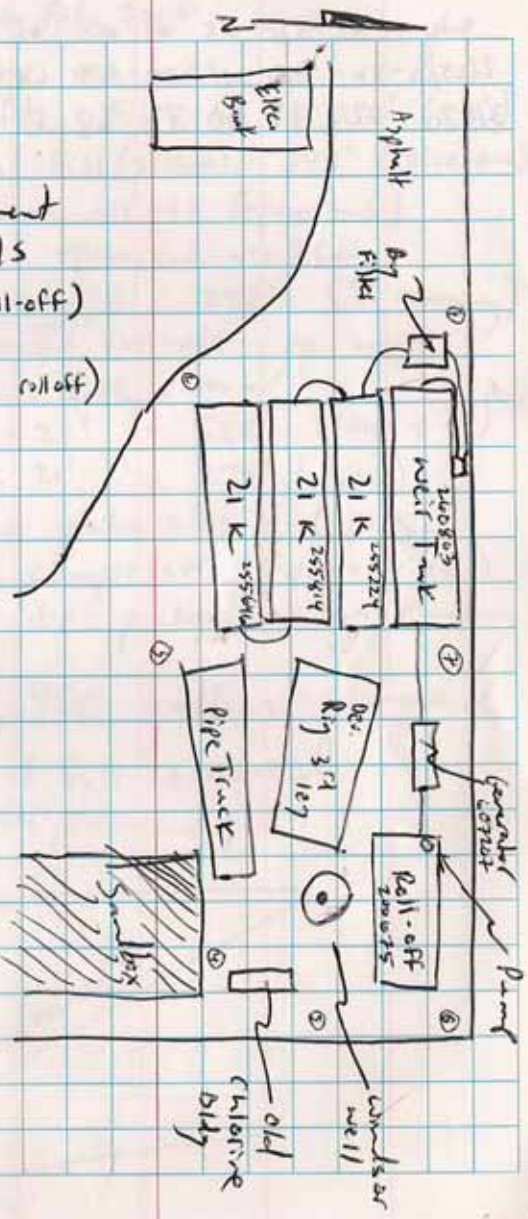
Total Removed: 25,900 gals
(Today)

Containment Remaining: 32,400 gals

17:15 Offsite
DJK

Total Containment
85,500 gals
(includes roll-off)

81,000 (w/o roll off)



Date	#1	#2	#3	#4	#5	#6	#7	
2/25/10	56	58	72	70	69	64	72	
3/5/10	62	79	80	72	68	63	63	(vac. truck)

D. Conner

26 Feb 2010

07:00 Layne resumes open-end airlift. Fill @ 577' (23')
Initial Fill (2/22/10): 545' (32' removal)

07:20 Resume air lift (open end)

13:00 Stop open end air lift
Checked fill: 592' (8' remaining)

13:05 ~~Offloaded~~ Transferred roll-off to weir
Secure site, cleaning
28 x 21' = 588' (pulled up 20')
AL 14 x 21' = 294' (eductor)

14:15 Layne mobs offsite (pipe truck, compressor, support truck)
Rig to be picked up on Monday

30,900 gallons removed
15' of fill removed
(8' remains)

D. Conner

592'

03-8-2010 (Mon)

08:15 Layne onsite, Mark + James

setup + move equipment into place, Fill depth: 590'

11:50 Start open-end airlift purging

15:10 Stop airlift

TD: 593' (3' fill removed today)

End Totalizer: 1,042,400

Gallons Purged: 13,000

15:30 Layne secures site + heads back to Fontana - need to pick up additional equipment

D. Lowell

3-9-2010 (Tues)

09:45 Layne onsite w/ dual-swab tool

Set up equipment

10:00 Start-up equipment

Generator Hr Meter: 4235.2

16:30 Finish pulling pipe

17:00 offsite

Hour Meter: 10454

Generator Hr: 4235.7

Fuel:

3-10-2010 (Wed)

07:00 Layne onsite; Mark away on CO_2 job so AZ crew onsite Enrique, Jose, & James Grubbs (GA).

08:00 Start installing dual-swab air lift system

09:15 Rain for Rent onsite to deliver & install check valve between roll-off tank & weir tank

~~[illegible]~~

11:30 Lunch

12:00 Resume

DSAL setting:

14 x 1¼" AL(21') = 294'

27 - 4" pipe 21' 2½" = 573'

10' Dual swab = 583'

1st Zone 583' - 573'

Air Compressor = 110 psi

Flow Meter: 10455 x100

Generator: 4235.7

Fuel: > 3/4 tank

3-10-10 (Cont'd)

14:03 Start DSAL @ 573 - 583'

Rust colored water @ discharge

14:45 DSAL @ 563 - 573'

Totalizer: 10506

14:58 Stop DSAL @

15:30 DSAL @ 553 - 563'

10512

15:45 DSAL @ 543 - 553'

16:00 Shut down

Flow Meter: 10545 x100

Generator: 4237.7

50' Screen DSAL & Swab to clear up

Total Gallons 9,100

16:15 Layne offsite

4 Zones @ 2275 gallons

3-11-10

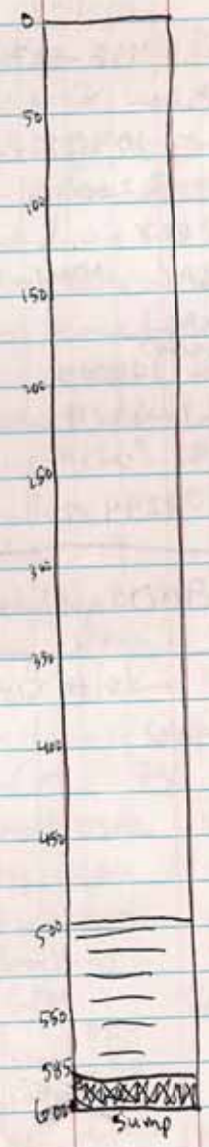
07:00 Layne onsite ; D. Payne onsite
08:30 Comm onsite w/ Ben H.
09:30 DSAL @ 543-553'
↓ Flow Meter: 10545
10:28 (58 mins) Shut down DSAL
Flow Meter: 10600
Gallons Removed: 5,500
10:52 start DSAL 533-543'
11:37 Stop DSAL (45 min)
Flow Meter: 10641
Gallons: 4100
GPM: 91
11:42 start DSAL 523-533'
12:28 Stop DSAL (46 mins)
Flow Meter: 10677
Gallons: 3600
GPM: 78
12:50 Start DSAL 513-523'
13:35 Stop DSAL
Flow Meter: 10720
Gallons: 4300
GPM: 96
13:35 Start DSAL @ 503-513'
14:22 Stop DSAL
Flow Meter: 10766
Gallons 4600
GPM 98

14:22 Resume 497-507'
(38 mins) 15:00 Stop DSAL
Flow Meter: 10798
Gallons: 3,200
GPM: 128
15:25 Start DSAL 474-485'
16:00 Stop DSAL
Flow Meter: 10844
~~Gallons~~ Gallons: 4,600
GPM: 131 ?

Generator Hr Meter: 4244.2

Total: 29,900 gallons today

Transferred 10 loads to OU-1
~25,000 gals



3/12/2010.

0700 - Layne; RC; D. Payne; D. Head onsite; EFR onsite

0710 - EFR begin/cont. H_2O transfer
- Layne cont. airlift @ Windsor....
↳ @ 450' (swab in 450 - 430)

0745 - start DSAL (450-440' zone) 440-450'
- Flowmeter 10844
- stop DSAL 10874

37 mins Flowmeter = 10944
gallons = 10,000
GPM =

0822 start DSAL 430 -440'
Flowmeter: 10908

09:00 start DSAL ~~10936~~ 10908

09:35 stop DSAL 10936
Flow Meter: ↑

10:18 Start 374-384'

11:00 stop DSAL 10984

11:33 Start 334-344'

12:08 Stop 11016

3/12/10 Cont'd

12:08 Start DSAL 324-334 (11016)
12:45 Stop DSAL
Flow Meter 11049

~~12:050~~ S
12:45 Start 320-330' 11049
13:25 Stop DSAL
Flow Meter: 11088

Generator Hr Meter: 4250.3
Flow Meter: 11095

3-15-2010 (Monday)

07:00 Cedric + Charles onsite; DJ running water
08:30 Layne onsite (Mark + James)
09:00 Drum delivery (12) for cleaning roll-off
09:45 Set up for WSE sampling
09:50 142' BGS (water level)
DTW: 142.00' bgs

WSE samples
10:00 147' : WINDSOR-147
10:10 320' WINDSOR-320

- Cedric + Charles cleaning roll-off bin.
- Bring empty clean drums from ov-1 to site so Layne can haul back to Fontana

14:00 Layne finished pulling airline + offsite

3/18/10 Cont'd

- prior to DSAL we will use open-ended AL to remove seds from base of well (as done prior to initial DSAL)

- will DSAL after sediments are removed

→ will run water through mix trailer and treat w/ soda ash to neutralize acid w/in well → to ~~pH~~ help increase the pH to not damage OU-1 when water is transferred for treatment

1500- Cedric + Charles offsite

1630- Layne offsite

D. Payne

3-19-10

0700 - Layne / D.P / DC on site
- Layne continuing w/ installation of open ended A.L. for sediment removal

- readings prior to pumping
  - generator = 4254.5 hours
  flow meter = 11105

- Open end airlift to clear/remove sediment/fill from bottom of well

- Neutralizing pH out of well w/ neutralizing trailer (w/ soda ash).

Checking pH ~7 before transferring to weir tank

Flow meter: 11197
Generator: 4256.2

04/06/10 TUE

0700 Onsite
Battelle: S. Mgr
D. Conner
Layne: M. Evans
Doug
Justin

0720 Drillers set up to trip out injection pipe.

1200 Layne offsite - pipe pulled

1115 Arroyo Arc Stub inspection
- City of Pasadena

1245 Arroyo footing concrete pour
- MSL
- Cemex

1315 Arroyo footing concrete pour complete
Block ocur @ 0630 on 04/07/10

1400 MSL off site

1530 RCF offsite

Kuhn's car breaks down
Rich to pick up at deliv.

1640 Offsite
S. Mgr

04/07/10 WED

0700 Onsite: D. Conner
S. Mgr

0730 Layne onsite M. Evans
Justin Rashad
- Trip in DSAL pipe

MSL onsite @ Arroyo
- Install Block Wall

RCF Digging Hydrant trench

1000 Conversation with M. Evans:
Start DSAL at top intervals to keep acid + chlorine down (b/c heavier than H_2O).
That way when finishing DSAL you are already at the bottom where all heavies are.

1015 COP inspection @ Arroyo
- Grant Uhl

1130 Grant pour @ Arroyo

1315 All flow meters in - electricians

04/08/10 THU

1000 Start swabbing
1006 End swabbing
Sand Silt ≈ 5 mL / 800 mL of H_2O
1015 Add pipe for Next interval
1116 Begin Airlifting 427 - 437 ft bgs
Chl = 0.00 10 mL sand
pH = 5.5 silt / 800 mL
1121 Begin swabbing
1129 End swabbing
1230 Noise complaint from Valerie
- Rock silt too loud
1300 Begin Air Lift 437 - 447 ft bgs Chl = 0.00
1310 Begin swabbing pH 5.5
1318 End Swabbing 10 mL sand/silt / 800 mL
1329 Begin Swabbing ~~to 15~~ Chl 0.00
~~of~~ 5 mL sand silt / 1000 mL
1335 End swabbing Chl = 0.00
1342 H_2O Clean Shows no Sand
1342 Begin Air Lifting 447 - 452 ft bgs
1345 Begin swabbing 7 mL sand/silt / 800 mL of H_2O
1352 End Swabbing Chl ≈ 0.00
1409 Well still showing pH 4.0 @ 447-452 ft bgs
1411 Add pipe for next zone
1504 Begin Airlifting 477 - 487 Chl ≈ 0.0, pH 4.0
1508 Begin Swabbing

04/08/10 THU

1518 End Swabbing 3 mL / 900 mL of H_2O
1519 Well Clean, No Sand
1520 Begin swabbing
1526 End swabbing 3 mL / sand silt / 900 mL H_2O
Chl ≈ 0.00
1535 H_2O free of Sand Silt
1538 Stop Air Lift
1539 Add pipe for Next zone
1558 Begin Swabbing 500-510
1613 End swabbing 1/5 mL of Sand/silt
1614 H_2O Clean ≈ 1 mL sand 900 mL H_2O 900 mL of H_2O
1619 Begin swabbing
1625 End swabbing 7 mL sand-silt / 900 mL H_2O
Chl ≈ 0.0
1628 End Air Lifting H_2O Clean up.

2 (85)

Beginning Gen Hrs = 04467.3
End Gen Hrs = 04275.4

Beginning Totalizer = 011460
End Totalizer = 11685

011685
011460
225
225 · 100 =
22500 gal

Note: Diamond Fence out Fri with stand up fence for 3 tanks below. S Myers

1700 Offsite

04/09/10

0700 Onsite: S. Mayus
RCF
Diamond Well 52 installing fence
Layne

0710 Layne add pipe to reach new zones

0800 Begin A.L. 510-520 ftbgs
pH = 3.0 out of well 2mL/sand silt / 900mL H_2O
Chl = 0.00

0815 Begin swabbing 510-520 ftbgs
0822 End swabbing 15 mL sand, silt / 900mL H_2O
Chl = 0.00

0831 NO Sand Dark Color H_2O out of well
0833 Begin swabbing 510-520 ftbgs
0838 End swabbing
10mL Sand/silt / 900 mL H_2O

0841 Begin A.L. 520-530 ftbgs
Brown H_2O Chl = 0.0

0847 Begin swabbing 520-530 ftbgs
0853 End swabbing 10mL sand silt / 900 mL H_2O
Chl = 0.0

0858 Begin swabbing 520-530 ftbgs
0901 End swabbing 7mL S.S. / 100mL H_2O

04/09/10

0905 End A.L. Add pipe for next zone
0924 Begin A.L. @ 530-540 ftbgs
pH = 4.0 out of well

0934 Begin swabbing zone 530-540 ftbgs
0936 End swabbing Chl = 0.0

0938 Begin swabbing zone 530-540 ftbgs
0942 End swabbing Chl = 0.0

0944 Begin A.L. zone 540-550 ftbgs
0955 ~~End S.~~ Begin swabbing 540-550 ftbgs
0955 End swabbing H_2O clear after swabbing
1000 ~~Ton~~ RCF Trenching for Hydrant Line
1000 End A.L. Add pipe for next zone
1021 Begin A.L. zone 550-560 ftbgs
pH = 4.00 out of well Chl = 0.0

1026 Begin swabbing zone 550-560 ftbgs
1032 End swabbing H_2O clear
1036 End A.L. - No sand

1037 Begin A.L. zone 560-570 ftbgs
1043 Shut down ~~A.L. pH = 4.0 out of well~~
1100 Begin A.L. zone 570-580 ftbgs
pH = 4.0 out of well

1107 Begin swabbing zone 570-580 ftbgs
1112 End swabbing zone 570-580 ftbgs

04/09/10

1118 Drop swab to 577 - 587
H_2O = clear pH out of well = 4.0

1137 Shut down A.L.

1230 Pull pipe
- trip out
- Demob P. truck + Chem Trailer

- Filters changed 2 time
- Mark noted H_2O not as sandy @ bottom intervals

For Mon: Layne deliver casing for Windsor well
- two pipe trucks park by Resivoir?

Totalizer:
Begin 011685 154-100=
End 011839 15400 gal

Gen hrs:
Begin 04275.4 5 hrs
End 04280.4

1630 offsite → S/Hajek

Liner Install

4/12/10

- Layne onsite w/ stainless steel wire-wrapped screen
  14 sections
14" 304 Stainless Steel
  0.080 slot
10:00 - 11:30 bailed well
  585' fill to 593.5'
12:00 - 17:00 Installed 5 joints of screen

Mark Evans, Justin Rexford, + Gus Frias (welder)
- EFR hauls 8 loads to OU-1

D. Conrad

MHTS Municipal Production Well Log Sheet - Windsor

Start of DAY

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	GPM	Totalizer Start	Totalizer Finish	Daily Volume Purged (Gallons)	Generator Hour Meter Start	Generator Hour Meter Finish	~~Fuel Level Start~~	~~Fuel Level Finish~~	Comments
4-20-10	320/325	8:30	9:20	DSAL		011839	011867		042833				DTW - 135ft
4-20-10	325/335	10:00	10:44			011867	011898						
4-20-10	335/345	10:56	11:20			011898	011921						
4-20-10	345/355	11:49	12:16			011921	011946						
4-20-10	355/365	1:42	2:10			011946	011967						
4-20-10	365/375	2:36	2:55			011967	011986						
4-20-10	375/385	3:18	3:30			011986	011997		→	042903			
4-21-10	375/385	12:47	1:00			011997	012009		042903				
4-21-10	385/395	1:22	1:51			012009	012029						
4-21-10	395/405	2:09	2:34			012029	012053						
4-21-10	405/415	3:02	3:29			012053	012071						
4-21-10	415/425	3:44	4:02			012071	012093		→	042938			
4-22-10	425/435	7:15	7:52			012093	012112		042938				
4-22-10	435/445	8:08	8:30			012112	012136						
4-22-10	445/455	9:00	9:28			012136	012157						
4-22-10	455/465	9:45	10:07			012157	012180						
4-22-10	465/475	10:27	10:56			012180	012202						
4-22-10	475/485	11:27	11:53			012202	012225						

END OF THE DAY

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

MHTS Municipal Production Well Log Sheet - Windsor

Date	Zone	Pump Start Time	Pump Finish Time	Method[A]	GPM	Totalizer Start	Totalizer Finish	Daily Volume Purged (Gallons)	Generator Hour Meter Start	Generator Hour Meter Finish	Fuel Level Start	Fuel Level Finish	Comments
4-22-10	485/495	1:10	1:36	DSAL		012225	012246		042938				
4-22-10	495/505	1:55	2:19			012246	012269						
4-22-10	505/515	2:42	3:05			012269	012293 [redacted]						
4-22-10	515/525	3:29	3:59			012293	012315			043011			
4-23-10 ~~4-22-10~~	525/535	7:30	7:59			012315	012337		043011				
4-23-10	535/545	8:15	8:39			012337	012359						
4-23-10	545/555	9:10	9:41			012359	012385						
4-23-10	555/565	10:06	10:37			012385	012411						
4-23-10	565/575	11:30	11:55			012411	012432						
4-23-10	575/580	12:55	1:21			012432	012457						5ft ONLY PIPE.
4-23-10	AIR lift The Bottom	1:43	2:21			012457	012485			043099			AIR lift Bottom of well to raise the ph!
4-26-10	570/580	10:28	10:54			012485	CONT'D to FLOW		043079				4½ to 5 PH!
4-26-10	570/580	10:55	11:48			CONT'D FLOW	012546						
4-26-10	570/580	11:43	4:32			012546	012815			043134			
4-27-10	570/580	7:30	11:30			012815	013032		043134	043199			PH = 6.4
4-28-10									043199	043254			

Notes:
OEAL = Open End Air lift
DSAL = Dual Swab Air lift
SP = Submersible Pump

Layne Christensen Co.

Test Pump Data

Page ___ of ___

Customer BATTELE / JPL Date 7-29-10 Job Number 1000-1965

Well Diameter _____ Depth of Well _____ Static Water Level 136.0' Well # and Name WINDSOR

Pump Setting 300' Airline Depth NONE Flowmeter: Start AC. FT. X OB1143 End _____

How Q Measured _____ How W.L.s measured METER Test Type: Development ✓ StepDraw-Down ___ Production ___

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
9:00							
9:30	WARM UP	READY TO GO.		LEAK @			FILTERS DAVE SAID HOLD OFF.
10:35			LEAKS				
10:40		RESTART					BEET RED RUSTY
10:43	1800 PPM	SHUT	DOWN	LEAK IN	PLANT		
10:43	1800 PPM	375					DIRTY
10:50		RESTART					DIRTY
11:00	1250 PPM	400		151.0'			DIRTY
11:06	1500 PPM	400		143.0'			CLEARING
11:10	900 PPM	400	11.0'	147.0'		1007	CLEARING
11:16	50 PPM	350	10.6'	146.6'		1063	CLEARING GRAVEL @ 42' INC. Q
11:26	10 PPM	350	22.0'	158.0'		1067	NEARLY CLEAR
11:36	1 PPM	350	22.0	158.0	15.90	1067	CLEAR P.H 6.8
12:00	1 PPM	350	23.3'	159.3	15.02	1067	
							35 LBS DISC INC. Q
12:17	1 PPM	400	24.0	160		1206	38 LBS DISC CLEAR
12:30	START AFTER 4		SURGES			LIGHT YELLOW	
12:45	30 PPM	450	29.0	165.0'	15.51	1207	40.0 LBS
1:00	10 PPM	425	22.5	158.5'	18.88	1207	37
1:05	START AFTER 5		SURGES		YELLOW 5 MINS TO CLEAR		
1:25		550		181		1392	54 LBS DISC REDUCE FLO
1:30	FILTERS WON'T TAKE FLOW OF					1331	
	475	PRESSURE INCREASES					
1:34	21.0 PPM	425				12:17	

Layne Christensen Co.

Test Pump Data

Page ___of___

Customer BETTELE JPL Date 7/29/10 Job Number 1000-1968

Well Diameter _____ Depth of Well _____ Static Water Level 136.0 Well # and Name WINDSOR

Pump Setting 300' Airline Depth NONE Flowmeter: Start _____ End 081302.5 51,997 GAL. PUMPED

How Q Measured PRODUCTION METER How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down___ Production___

Total Hours This Sheet _____ Person Conducting Well Test _____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
1:50	START STOP @ SAME FLO					1207	LIGHT CLOUDY
2:10	6 PPM	475	28.4'	164.4'	16.72	1206	CLEAR DISC. 37
2:15	RESTART 2 SURGES			VERY CLOUDY			4 MINS & CLEARING
2:35	5 PPM	500	30.0'	166.0	16.66	1205	31 DISCH. CLEAR
2:42	START AFTER 4 SURGES				VERY VERY CLOUDY		
3:02	5 PPM	510	32.0	168.0'	15.93	1208	30 NE DISC.
							12,400 TO RAW FOR REST TANK
							51,997 OUT OF WELL
							39,597
							95 GALL IN 37PE0020

Layne Christensen Co. **Test Pump Data** Page ___of___

Customer BATTELLE / JPL Date 7-30-10 Job Number 1000 - 1968

Well Diameter _____ Depth of Well _____ Static Water Level 131.8' Well # and Name WINDSOR

Pump Setting 300 Airline Depth _____ Flowmeter: Start 081302.5 AC FT End _____

How Q Measured METER How W.L.s measured ELECT. Test Type: Development___ StepDraw-Down___ Production___

Total Hours This Sheet _____ Person Conducting Well Test _____

FILTERS EAST 010760
WEST 021491

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
7:00	START AFTER 3 SURGES VERY CLOUDY 5 MINS						SET UP ADDED COOLING LINE
7:30	STATIC LEVEL UP. 7:30 START						
7:50	.2 5.3 PPM	520	31.4'	163.2'	16.56	1215	34 LBS DIS
7:55		INCREASE Q				1257	CLEAR
8:05	.3 3.5 PPM	560	39.8'	171.6'	14.07	1257	CLEAR
8:12	START AFTER 4 SURGES VERY CLOUDY 5 MINS						
8:32	1.5 PPM	540	37.3'	169.1	14.47	1226	30 LBS DISC.
8:45	.6 START AFTER 5 SURGES					VERY	CLOUDY
9:00	1.5 PPM	560	39.5	171.3'	14.17	1235	CLEAR - SHUT DOWN TANK FULL
9:45	~~1.5 PPM~~						
10:05	1.5 PPM					1235	
10:10	2 PPM	550	36.1'	167.9'	15.23	1235	CLEAR 30 LBS DISC.
10:20	START AFTER 5 SURGES					VERY	CLOUDY
10:40	12 PPM	610	44.0'	175.8'	13.86	1302	34 LBS
10:51	START AFTER 5 SURGES					VERY	CLOUDY 34 LBS DISC.
11:11	1.5 PPM	640	47.2	179.0	13.55	1327	34 LBS DISC. CLEAR
11:26	START AFTER 5 SURGES					VERY	CLOUDY
	WAIT TILL BACK WASH ENDS BOTH						3.5 LBS. DISC. 1250 RPM
11:54	INC. Q						
12:05	26 PPM	835	64.0'	195.8	13.04	1375	SLIGHT CLOUDY
12:10	START AFTER 4 SURGES ~~[illegible]~~					1210	VERY CLOUDY
12:15	BOTH FILTERS INTO BACKWASH HAD TO BACK OFF						
12:28	START AFTER 3 MORE SURGES						
12:48	24 PPM	680	50.0	181.8'	13.60	1334	33 LBS DISC.

Layne Christensen Co. — Test Pump Data

Page ___ of ___

Customer BATTELLE - JPL Date 7-30-10 Job Number 1000-1968

Well Diameter ____ Depth of Well ____ Static Water Level 131.8' Well # and Name WINDSOR

Pump Setting 300.0' Airline Depth ____ Flowmeter: Start ____ End ____

How Q Measured METER How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down ___ Production ___

Total Hours This Sheet 8.5 Person Conducting Well Test ____

193,216.4 GAL. PUMP TODAY

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
12:48		905	64.3	195.8	14.07	1395	FROM LAST PAGE
1:05	START AFTER 5			SURGES	VERY	CLOUDY	
1:40	26 PPM	660	45.8'	177.6'	14.41	1329	35 LBS DISC.
1:50	START	AFTER	5 SURGES		VERY	CLOUDY	
1:56	BOTH	FILTERS	BACKWASHING	IDLE	DOWN	1409 TO 1295	1000 G.P.M. 6 MINS
2:16	215 PPM	660	48.2	180.0'	13.69		P.H. 6.8 32 LBS DISC.
2:35	START AFTER 5			SURGES	CLOUDY	1000 G.P.M. 8 MINS	
2:55	103 PPM			194.1'		1390	30 LBS DISC.
3:05	1 PPM	640		175.0		1310	
		SHUT	DOWN	GONE	3:30 PM		
							PROD. MTR 081.8955 AC. FT.
							FILTERS FAST 010946.00 GALLONS 18,600
							" WEST 021630.00 GALLONS 13,900
							TO FILTERS 32,500

Layne Christensen Co.

Test Pump Data

Page ___ of ___

Customer BATTELLE JPL Date 8-2-10 Job Number 1000-1968

Well Diameter _____ Depth of Well _____ Static Water Level 131.4' Well # and Name WINDSOR

Pump Setting 300.0' Airline Depth _____ Flowmeter: Start 081.8955 End _____

How Q Measured METER How W.L.s measured ELECT. Test Type: Development___ StepDraw-Down___ Production___

Total Hours This Sheet _____ Person Conducting Well Test _____ EAST 010946.00 ~~WEST~~ 021630.00

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
							GRAVEL MEASURED @ 43.8'
7:40	FIRST START OF DAY						
7:50	.3 27 PPM	800	56.0'	187.4'	15.35	1349	31 LBS DISC. CLEAR
8:00	.6	769	49.9'	181.3'	15.41		CLEAR VERY SMALL AMT AIR DISC. 33 OR GAS
8:10		START AFTER 5 SURGES				VERY CLOUDY	
8:40	.4 7 PPM	940	68.2'	199.6	13.78	1409	DISC. 35 LBS
8:50		~~940~~ START AFTER 5 SURGES				LIGHT YELLOW 5 MINS	
9:20	1.4 7 PPM	1030	80.5'	211.9	12.79	1479	CLEAR VERY SMALL AMT AIR 37 LBS DISC. 4
9:30		START AFTER 5 SURGES				YELLOW WITH MICA 5 MINS	
10:00	10 PPM	1060	83.6'	215.0'	12.67	1490	CLEAR SMALL AMT. AIR
10:10	START UP AFTER 5 SURGES					YELLOW CLEAR IN 5 MINS	
10:40	200 PPM	1150	93.9'			1550	36 LBS DISC WELL BROKE DOWN SILTY MATERIAL
10:50		START AFTER 5 SURGES				YELLOW WITH MICA	
11:30	1.2 20 PPM	1000	73.2'	204.6	13.66	1409	32 LBS DISC.
11:50	START AFTER 5 SURGES					YELLOW WATER 5 MINS	
12:10	.6 16 PPM	1025	77.6'	209.0	13.20	14.56	36 LBS DISC
12:20	START AFTER 5 SURGES						
12:40	.6 16 PPM	1000	73.0'	204.4	13.69	1407	36 LBS DISC CLEAR SMALL AMT AIR
12:48	4 PPM	1350	99.6'	231.0	13.55	1592	35 LBS DISC
12:56		START AFTER 5 SURGES					
1:16	20 PPM	1010	71.0'	202.4	14.22	1410	33 LBS DISC CLEAR SOME AIR
1:36	START AFTER 5 SURGES					LIGHT YELLOW 3 MINS.	
1:56	20 PPM	1015	70.5	201.9'	14.39	1410	33 LBS CLEAR
2:02	INCREASE FLO						
2:10	40 PPM	1420	103.1	234.5'	13.77	1620	YELLOW WITH MICA
2:13	START AFTER 3 SURGES						

Layne Christensen Co. **Test Pump Data** Page ___ of ___

Customer BATTELE / JPL Date 8-2-10 Job Number 1000-1968

Well Diameter _____ Depth of Well _____ Static Water Level 131.4' Well # and Name WINDSOR

Pump Setting 300' Airline Depth _____ Flowmeter: Start _____ End 083.098

How Q Measured METER How W.L.s measured ELECT Test Type: Development___ StepDraw-Down___ Production___

Total Hours This Sheet 9.25 Person Conducting Well Test _____

23.25 TOTAL

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
2:13PM							
2:38	1.3 ~~27.5~~ PPM	1040	76.1'	207.5'	13.66	1428	CLEAR VERY SMALL AMT. AIR 32 LBS DISC. PH. 6.8
2:38	INCREASE Q						
2:48	50 PPM	1550	114.3	245.7'	13.56 ~~1770~~	~~1770~~	CLEAR WITH SMAL AMT AIR
2:55	START AFTER 5 SURGES.					YELLOW	WITH MICA 7 MINS
3:20	10 PPM	1050	78.5'	209.9'	13.37	1449	34 LBS DISC. CLEAR SMALL AMT AIR
3:45	2 PPM	1047	77.8'	209.2'		1449	35 LBS DISC. CLEAR
3:55	RESTART AFTER 5 SURGES				CLOUDY	ON START	MUCH BETTER
4:15	6 PPM	1065	78.1	209.5'	13.63	1460	CLEAR WITH SMALL AMT. AIR
4:25	SURGE 2 TIME			START AT HIGH		FLOW	WATER IS GREEN GRAY COLOR
4:45	15 PPM	1580	118.5	249.9	13.33	1776	VERY CLOUDY
	SHUT	DOWN					
							MTR. READS
							W 021813.00 = 18,300 } 49,100
							E 011254.50 = 30,800 }
							PROD 083.098 = 391,809

Layne Christensen Co. — Test Pump Data

Customer BATTELLE JPL Date 8-3-10 Job Number 1000-1968

Well Diameter ____ Depth of Well ____ Static Water Level 132.0' Well # and Name WINDSOR MHTS

Pump Setting 300' Airline Depth ____ Flowmeter: Start 083.098 End ____

How Q Measured METER How W.L.s measured ELECT. Test Type: Development___ StepDraw-Down___ Production___

Total Hours This Sheet ____ Person Conducting Well Test ____

7:30 TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	FILTER METERS EAST 011254.00 WEST 021813.00 COMMENTS
7:45	START AFTER		5 SURGES			YELLOW	8 MINS TURBITY 87
7:55	.7 21.2 PPM	650	32.0	164.0'	20.31	1279	30 LBS DISC CLEAR TURBITY 0
8:05	.75 2.1 PPM	650	32.2	164.2	20.18		30 LBS DISC. TU 0
8:10	START AFTER 5		SURGES				TU 35
8:30	15 PPM	1000	59.5	191.2	16.80	1407	
8:35	START AFTER 5		SURGES				DISC. 33 TU 35 YELLOW 5 MINS CLEAR
8:55	20 PPM	975	57.1'	189.1	17.07	1407	CLEAR SOME AIR TU 0
9:05	—	980	61.8'	193.8	15.85	1407	CLEAR ALMOST NO AIR DISC. 53 TU 0
9:10	50 PPM	1620	149.5'	281.5	10.83	1800	INC. Q HAD TO SHUT DOWN PLUG FILTERS TU 47
9:15	START AFTER 2		SURGES	REDUCE Q			
9:30	20 PPM	600	39.4'	171.4'	15.22	1295	DISC. 32 LBS CLEAR WATER TU 0
9:39	START UP	AFTER	5 SURGES			LIGHT YELLOW	
9:49						1506	REDUCE Q 100 LBS ON FILTERS
9:59		940	58.2'	190.2'		1398	34 LBS DISC
10:05	START AFTER 5		SURGES			LIGHT YELLOW	
10:30	.2	995		194.5'		1399	33 LBS DISC
10:40	START AFTER HIGH FLO & 4 SURGES						YELLOW
11:05	20 PPM	1070	79.9'	211.9'	13.39	1485	CLEAR TU 0
12:00	.2 2.5	1080	77.8'	209.8'	13.88	1480	VERY CLEAR TU 0
12:03		INC. Q				1600	
12:20	3 PPM	1200	97.0	229.0'	12.37	1614	38 LBS DISC.
	3 PPM	1295	99.6	231.6'	13.00	1614	34 LBS CLEAR
12:37	START AFTER 5		SURGES				LIGHT CLOUDY TU 4
1:07	.6	1270	103.6'	235.6	12.25	1614	CLEAR WITH SOME AIR 33 LBS DISC. TU 0
	FLOWS ABOVE 1200 G.P.M. HAVE LARGER AMT. OF AIR OR GASES						

RATRUJILLO@LAYNECHRISTENSS

Layne Christensen Co. — Test Pump Data

Customer BATTELLE JPL Date 8-3-10 Job Number 1000-1968

Well Diameter ____ Depth of Well ____ Static Water Level 132.0' Well # and Name WINDSOR MHTS

Pump Setting 300 Airline Depth ____ Flowmeter: Start ____ End ____

How Q Measured METER How W.L.s measured ELECT. Test Type: Development___ StepDraw-Down___ Production___

Total Hours This Sheet 9.0 Person Conducting Well Test ____

32.25 HRS. 446,239 GAL PUMPED TODAY

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
1:15	TO	PLANT	19 LBS DISC			1569	P.H. 6.8 TU 0
1:35	2.1 PPM	1280	107.5'	239.5'	11.90	1569	TU 0
1:55	1 PPM	1280	108.9'	240.9'	11.75	1605	TU 0 DISC. 20 LBS. CLEAR VERY SMALL AMT AIR
1:58							INC. Q
2:18	.6 PPM	1322	114.8'	246.8'	11.51	1605	DISC. 22 LBS TU 0 CLEAR
2:28	.5 PPM	1320	115.4'	247.4'	11.43	1607	DISC. 22 TU 0 CLEAR
2:29		INC. Q				1665	DISC. 20 TU 0 CLEAR SMALL AIR
2:49	.8 PPM	1435	127.9'	259.9'	11.21	1665	DISC. 20 TU 0 CLEAR SMALL AIR
3:09	.5 PPM	1450	128.1'	260.1'	11.31	1665	
3:10	INC. Q		~~136.0'~~	~~268.0~~		1711	CLEAR TU 0
3:30	.5 PPM	1490	136.0	268.0'	10.95	1711	21 LBS DISC. TU 0 CLEAR SMALL AIR
3:50	.6 PPM	1485	137.8'	269.8'	10.77	1711	21 LBS DISC. TU 0 CLEAR SMALL AMT. AIR
4:10	.6 PPM	1500	140.0	272.0'	10.71	1720	21 LBS DISC TU 0 CLEAR LITTLE AIR
4:30	.4 PPM	1450	129.0'	261.0'	11.24	1770	48 LBS DISC @ 1770 RPM 39' OF COVER
							METER READS FILTERS EAST 011464.10
							WEST 02193790
							PRODCT 08467.500
							EAST 21,010 GAL
							WEST 12,490 GAL.

Layne Christensen Co. **Test Pump Data**

Customer BETTELE JPL Date 8-4-10 Job Number 1000-1968

Well Diameter ___ Depth of Well ___ Static Water Level 132.1' Well # and Name WINDSOR

Pump Setting 300' Airline Depth ___ Flowmeter: Start 084675.500 End ___ @ 50-1"

How Q Measured METER How W.L.s measured ELECT Test Type: Development___ StepDraw-Down___ Production___

Total Hours This Sheet ___ Person Conducting Well Test ___

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
7:30	SURGING CHANGE GATES THRU FILTERS TU 45 DISC 24 LBS						
7:40	START SLIGHT COLOR CLEAN IN 10 MINS.						
7:55	.2 10.6 PPM	240	10.8'	142.9'	22.22	1014	23 LBS. DISC. TU 0 CLEAR WATER
8:00	.21 1.0 PPM	240	10.9'	143.0	22.01	1014	SAME
8:15	START AFTER 10 SURGES WATER IS NEARLY CLEAR TU 23 CLEAR IN 3 MINS						
8:45	.5 5.1 PPM	380	17.9'	150.0	21.22	1113	33 LBS DISC. CLEAR TU 0 P.H. 6.8
9:04	START AFTER 10 SURGES LIGHT CLOUDY TURNED ORANGE TU 212 CLEAR 5 MINS.						
9:24	.9 10.6 PPM	490	22.9'	155.0	21.39	1199	30 LBS DISC. CLEAR TU 0
9:38	START AFTER 12 SURGES ORANGE YELLOW COLOR 5 MINS TO CLEAR TU ~~220~~ 173						
9:58	1.3 cc 10.6 PPM	730	36.4'	168.5	20.05	1302	30 LBS DISC CLEAR TU 0
10:20	START AFTER 12 SURGES VERY CLOUDY TU 78 BOTH FILTER BACKWASHING						
10:50	1.9 10.6 PPM	1020	56.0	188.1'	1821	1420	32 LBS CLEAR TU 0
10:58	START AFTER 10 SURGES LIGHT DISCOLORATION CLEAR 5 MINS TU 17						
11:28	2.7 cc 14.1 PPM	1050	57.8'	189.9'	18.16	1430	33 LBS CLEAR TU 0
11:46	START AFTER 10 SURGES WATER IS TU 80 CLEAR IN 4 MINS.						
12:10	2.75 1.1 PPM	510	26.9'	159.0'	18.95	1207	CRYSTA CLEAR 29 LBS DISC.
12:18	START AFTER 10 SURGES SLIGHT DISCOLORATION TU 2 BOTH FILTER BACKWASHING						
12:48	3.0 4.4 PPM	1140	69.5'	201.6'	16.40	1518	36 LBS DISC. NTU 0
1:03	START AFTER 10 SURGES VERY SMALL DISCOLORATION NTU 1						
1:33	3.35 cc 6.1	1375	80.8'	212.9'	17.01	1594	35 LBS DISC. NTU 0
1:55	START AFTER 5 SURGES CLEAR						NTU 0
2:40	SWITCH INTO SYSTEM PER CUSTOMER						
2:50	.6 PPM	1300		197.1'		1440	20 LBS DISC
3:00	.7 PPM	1280		197.2		1442	19 LBS DISC
3:00		INCREAS TO 1500 RPM					

Layne Christensen Co. — Test Pump Data

Customer BETTELLE JPL Date 8-4-10 Job Number 1600-1968

Well Diameter _____ Depth of Well _____ Static Water Level 132.1 Well # and Name WINDSOR

Pump Setting 300' Airline Depth _____ Flowmeter: Start _____ End 085800

How Q Measured METER How W.L.s measured ELECT. Test Type: Development ✓ StepDraw-Down ___ Production ___

Total Hours This Sheet 9.0 Person Conducting Well Test _____

366,394 GAL PUMPED TODAY

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS
3:00	FROM OTHER PAGE				INTO SYSTEM		
3:10 PM	.6 PPM	1300	73.3'	205.4	17.73	1502	CLEAR 22 LBS DISC. NTU 0
3:20 PM	.8 PPM	1320	79.9'	212.0'	16.52	1532	21 LBS DISC.
3:30 PM	.6 PPM	1385	90.5'	222.6'	15.30	1607	20 LBS DISC.
3:40	.6 PPM	1460	99.2'	231.3'	14.71	1667	22 LBS DISC. CLEAN
4:00	.6 PPM	1520	107.1'	239.2'	14.19	1711	25 LBS DISC. CLEAN
4:00	INC. Q	1770 RPM					CLEAR NTU 0 DISC. 26 LBS.
4:15	.7 PPM	1616	115.4'	247.5'	14.00	1770	CLEAR NTU 0 DISC. 27 LBS.
4:30	.7 PPM	1620	119.1'	251.2'	13.60	1770	CLEAR NTU 0 DISC. 26.5 LBS.
					FILTER METERS		EAST 11622.00 15790 GAL
							WEST 22049.00 11110
							26,900 TOTAL

806 424

Layne Christensen Co. — Test Pump Data

Customer BETTELLE J.P.L. Date 8-5-10 Job Number 1000-1968

Well Diameter ____ Depth of Well ____ Static Water Level 139.8' Well # and Name WINDSOR

Pump Setting 300' Airline Depth ____ Flowmeter: Start 085800 End ____

How Q Measured METER How W.L.s measured TRANSDUCER ELECTRIC Test Type: Development ___ StepDraw-Down ✓ Production ___

Total Hours This Sheet ____ Person Conducting Well Test ____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS	085.800
	START TO FILTERS & SWITCH TO PLANT							
8:50		820				1320	DISC. 31 LBS CLEAR	
8:55	.07 5.3 PPM	820		180.8'		1319	" "	
9:00	.1 3 PPM	825		181.9'		1320	" " CLEAR INTO PLANT	
9:05	.1	860	47.7'	187.5'	18.02	1282	DISC. 16 LBS. CLEAR	
9:20	.11 .2 PPM	890	49.1'	188.9'	18.12	1282	DISC. 16 LBS CLEAR	085.882 20
9:35	.11	885	50.25'	190.05'	17.61	1282	DISC. 16 LBS CLEAR	085.923
9:50	.12 .17 PPM	880	51.01'	190.81'	17.25	1282	DISC. 16 LBS CLEAR	085.963 5
10:05	.125 .17 PPM	870	51.4'	191.2'	16.92	1282	DISC 18 LBS "	086.003 4
10:20	.13 .17 PPM	860	51.7'	191.5'	16.63	1282	DISC 18.5 LBS CLEAR	86.043
10:35	—	850	51.85'	191.65'	16.39	1282	DISC 19 LBS CLEAR	86.082 15
10:50	.14 .17 PPM	845	51.9'	191.7'	16.28	1282	" " "	86.120 0
						(871 G.P.M. AVG.)		
10:50						1506	DISC. 23 LBS " INC. Q	
10:55	.18 4.2 PPM		78.1'	217.9'		1506	" " "	
11:00	.21 3.1 PPM		78.95'	218.75'		1506	DISC. 23.5 LBS "	
11:05	.28 7.4 PPM	1230	79.0'	218.85'	15.56	1506	DISC. 25 LBS	86.177 6
11:20	.29 .35 PPM	1215	79.6'	219.4'	15.26	1506	DISC. 25 LBS.	86.233 4
11:35	—	1195	80.4'	220.2'	14.86	1506	DISC 26 LBS (INC. Q 1514 R.P.M.)	86.288 4
11:50	.30 .17 PPM	1205	81.9'	221.7'	14.71	1515	DISC. 26 LBS.	86.343 8
12:05	—	1200	82.3'	222.1'	14.58	1515	DISC 27 LBS	86.399
12:20	.31 .17 PPM	1195	82.9'	222.7'	14.44	1515	DISC. 27 LBS.	
12:35	—	1192	83.1'	222.9'	14.34	1515	DISC 27 LBS	86.508 8
12:50	.32 .17 PPM	1190	83.4'	223.2'	14.26	1515	DISC. 27 LBS CLEAR	86.547 7
						(1202 G.P.M. AVG.)		

Layne Christensen Co. — Test Pump Data

Customer BETTELLE / JPL Date 8-5-10 Job Number 1000-1968

Well Diameter ___ Depth of Well ___ Static Water Level 139.8' Well # and Name WINDSOR

Pump Setting 300' Airline Depth ___ Flowmeter: Start ___ End ___

How Q Measured METER How W.L.s measured TRANSDUCER ELECT. Test Type: Development ___ StepDraw-Down ✓ Production ___

Total Hours This Sheet ___ Person Conducting Well Test ___

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS	
								~~[illegible]~~ 86.5637
					INC. Q			
12:50							28 LBS DISC. CLEAR	
12:55	.35 3.1 PPM	1440	101.7'	241.5'	14.15	1667	28.5 DISC.	86.5853
1:00	.46 5.3 PPM	1432	102.2'	242.0'	14.01	1667	29 LBS DISC.	86.6074
1:05	.45 5.3 PPM	1430	102.7'	242.5'	13.92	1667	29.5 DISC.	86.6292
1:20	.50 1.76 PPM	1428	103.5'	243.3'	13.79	1667	30 LBS DISC.	86.6949
1:35	.51 .35 PPM	1418	104.5'	244.3'	13.56	1667	30 LBS DISC. CLEAR	86.760'
1:50	.52 .35 PPM	1412	105.0'	244.8'	13.44	1665	30.5 LBS DISC. "	86.825'
2:05	—	1410	105.15'	244.95'	13.40	1665	30.5 LBS DISC.	86.890
2:20	.6 1.4 PPM	1404	105.3'	245.1'	13.33	1665	31 LBS. DISC.	86.9545
2:35	.61 .35 PPM	1400	105.45'	245.25'	13.27	1665	31 LBS DISC.	87.0187
2:50	.615 .17 PPM	1399.5	105.6'	245.4'	13.21	1665	31.5 LBS DISC. CLEAR	87.0829
				INC. Q			(1409.7 G.P.M. AVG.)	
2:55	.62 .53 PPM	1650	117.0'	256.8'		1764	35 LBS DISC. CLEAR	
3:00	.68 8.4 PPM	1625	117.5'	257.3'		1764	35 LBS DISC. CLEAR INC. Q	
3:05	—	1600	118.6'	258.4'	13.49	1770	35 LBS DISC. CLEAR	87.154
3:20	.75 3.7 PPM	1550	119.3'	259.1'	12.99	1772	35 LBS DISC. CLEAR INC. Q	87.2253
3:35	.80 1.7 PPM	1558	121.4'	261.25'	12.83	1786	36 LBS DISC. CLEAR	87.2969
3:50	—	1556	122.3'	262.1'	12.72	1786	37 LBS DISC. CLEAR	87.3685
4:05	—	1554	122.3'	262.1'	12.70	1784	37.5 DISC. CLEAR	87.4399
4:20	.825 .29 PPM	1550	122.3'	262.1'	12.67	1784	38.0 DISC. CLEAR	87.511
4:35	—	1548	122.35	262.15'	12.65	1784	39.0 DISC. CLEAR	87.5875
4:50	.83 .08 PPM	1548	122.35	262.15'	12.65	1784	39.5 DISC. CLEAR	87.653

(1548 G.P.M. AVG. FLO)

325828.8 GALLON = 1 AC. FT.

Layne Christensen Co. **Test Pump Data** Page 13 of ___

Customer BETTELLE J.P.L. Date 8-9-10 Job Number 1000-1968

Well Diameter ___ Depth of Well ___ Static Water Level 139.65 Well # and Name WINDSOR

Pump Setting 300' Airline Depth ___ Flowmeter: Start 87.6.53 End ___

How Q Measured METER How W.L.s measured TRANSDUCER ELECT. Test Type: Development ___ StepDraw-Down ___ Production ✓

Total Hours This Sheet ___ Person Conducting Well Test ___

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS	
9:05	ELECT MOTOR	FIXED	SPEED.	THROATLE	IN 2	MINS.	CLOUDY 4 MINS.	
9:10	.5 .53 PPM	1640	99.45'	239.1'			43 LBS. DISC. CLEAR	
9:15	.2 10.4 PPM	1520	97.3'	236.95'			55 LBS DISC "	
9:20	.7 10.6 PPM	1500	98.55'	238.2'	15.22		58 LBS DISC. "	
9:25	–	1500	100.35'	240.0'	14.94		58.5 LBS. DISC. "	
9:30	–	1495	100.85'	240.5'	14.56		59 LBS DISC. "	87.7659
9:35	–	1490	102.65'	242.3'	14.51		INFLUENT 50 LBS EFFLUENT 24 LBS 60 LBS DISC.	87.7887
9:50	.75 .88 PPM	1483	104.35'	244.0'	14.21		60 LBS DISC. CLEAR	87.8576
10:05	–	1466	106.15'	245.8"	13.81		61 LBS DISC. CLEAR	87.9245
10:20	–	1458	107.3'	246.95'	13.58		61.5 LBS DISC. CLEAR	87.9916
10:35	–	1449	108.55'	248.2	13.34		62.0 LB DISC. CLEAR FILTERS IN 55 LBS. OUT 25 LBS.	88.0583
10:50	.75 –	1445	109.55'	249.2'	13.19		63.0 LBS DISC. CLEAR	
11:05	.77 .15 PPM	1442	109.95'	249.6'	13.11		63.0 LBS DISC.	88.191
11:35	–	1433	110.1'	249.8'	13.01		65.0 LBS DISC. 2ND FILTER OPEN ADJ VALVES	88.323
12.05	–	1465	115.9'	255.6'	12.62		56.0 LBS DISC.	88.452
12:35	–	1440	116.65'	256.3'	12.34		56.0 LBS DISC.	88.591
1:05		1455	117.3'	257.0'	12.40		56.5 LBS DISC. CLEAR	88.7251
1:35	–	1455	118.0'	257.7'	12.33		57.0 LBS DISC.	88.859
2:05	–	1448	118.25'	257.95'	12.24		57.5 LBS DISC. FILTER DIFFERENT. CLEAR 36-31 LBS.	88.9923
3:05	.78 .002 PPM	1442	118.9	258.55	12.12		58.0 LBS DISC.	89.2578
4:05	–	1438	119.5	259.15	12.03		58.5 LBS DISC. CLEAR	89.5222
5:05	–	1431	119.85	259.35	11.93		59.5 LBS DISC	89.7857
6:05	.78 –	1428	119.87	259.52	11.91		62 LBS DISC	90.0335 0356
								90

Layne Christensen Co. **Test Pump Data** Page 14 of ___

Customer BATTELLE JPL Date 8-9 & 10-2010 Job Number 1000-1968

Well Diameter ____ Depth of Well ____ Static Water Level 139.65 Well # and Name ____

Pump Setting 300' Airline Depth ____ Flowmeter: Start ____ End ____

How Q Measured METER How W.L.s measured TRANSDUCER ELECT Test Type: Development___ StepDraw-Down___ Production ✓

Total Hours This Sheet ____ Person Conducting Well Test ____

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS	
6:05	.78	1428	119.87	259.52	11.91		DISC. 62 LBS DISC.	90.035°
7:05	.06	~~1537~~ 1441	121.39	261.04	11.86		61 LBS (Flow 1537 Calculation)	90.318°
8:05	.6	1422	121.39	261.04	11.71		62 LBS	90.5799
9:05	.6	1423	121.25	260.90	11.73		63 LBS	90.8420
10:05	.6	1411	120.81	260.46	11.68		64 LBS	91.0999
11:05	.6	1400	120.71	260.36	11.61		65 LBS	91.3578
12:05 AM	" "	1396	120.61	260.26	11.57		65.5 LBS	91.6149
1:05	" "	1402	122.76	262.41	11.42		62 LBS	91.8730
2:05	" "	1414	122.58	262.23	11.53		63 LBS	92.1334
3:05	" "	1414	121.97	261.62	11.59		64 LBS	92.3938
4:05	" "	1400	121.60	261.25	11.51		64.5 LBS	92.6573
5:05	" "	1395	121.22	260.87	11.51		65 LBS	92.9075
6:05	—	1390	120.8	260.53	11.50		60 LBS ADJ Q 62 LBS	93.158
7:05	.78	1400	122.55	262.2	11.50		63 LBS.	93.414
8:05	—	1408	122.4	262.1	11.50		63.5 LBS CLEAR	
9:05	—	1405	122.44	262.14	11.47		64 LBS DISC	93.930
	NO MEASURABLE SAND SINCE 3:00 PM 8/8/10							
							(24 HR. AVG. 1420.2 G.P.M.)	
9:07	WATER DOWN ACCESS HOLE				10 G.P.M.			94.1838
10:05		1400	122.3	262.0	11.44		64.5 DISC. FILTERS 60 LBS INF. 54 LBS EFF.	94.1838
11:05		1395	122.25	261.9	11.41		65.0 DISC.	94.4385
11:22	ADJ	Q	61 LBS					
12:14		1439	123.9	263.6			61.0 LB DISC.	94.7364
12:32	SHUT DOWN							94.8085

Layne Christensen Co. **Test Pump Data** Page 15 of ___

Customer BATTELLE J.P.L Date 8-11-10 Job Number 1000-1968

Well Diameter ___ Depth of Well ___ Static Water Level 140.4' Well # and Name WINDSOR

Pump Setting 300' Airline Depth ___ Flowmeter: Start 094.8085 End ___

How Q Measured METER How W.L.s measured TRANSDUCER ELECT. Test Type: Development ___ StepDraw-Down ___ Production ___ SPINNER LOG TEST

Total Hours This Sheet 7 HRS Person Conducting Well Test ___

TIME	PPM SAND	FLOW GPM	DRAW DOWN	PUMPING LEVEL	SPECIFIC CAPACITY	ENGINE RPM	COMMENTS	94.8085
		START FOR SPINNER & THIEF SAMPLES						
7:40	START							
7:45	10 PPM	1500		235.0'		1772	DISC. 60 LBS CLEAR	
7:50	3 PPM	1480		237.8'			DISC. 60 LBS "	94.856
7:55	.5 PPM	1460	98.7'	239.1'	14.79		DISC. 60 LBS. CLEAR	94.889
8:00	.01 PPM	1460	100.9'	241.3'	14.46		DISC. 60.5 CLEAR AIR SMALL	94.902
8:15	–	1468	103.8'	244.2'	14.14		DISC. 60.0 "	94.970
8:30	–	1468	105.7'	246.1'	13.88		DISC. 60.0 LBS CLEAR SMALL AIR	95.038
8:45	–	1464	107.3'	247.7'	13.64		DISC. 61.0 LBS.	95.105
9:00	–	1460	108.6'	249.0'	13.44	1772	DISC. 62.0 LBS.	95.176
9:15	–	1455	109.2'	249.6'	13.32		DISC. 62.5 LBS.	95.2
9:30	–	1450	109.85'	250.25'	13.19	1772	DISC. 63.0 LBS	95.305
9:45	–	1440	110.6'	251.0'	13.01		DISC. 63.0 LBS CLEAR SOME AIR	95.372
10:00	–	1435	111.0'	251.4'	12.92	1772	DISC. 63.5 LBS CLEAR SOME AIR.	95.438
10:45	–	1425	111.5'	251.9'	12.78		DISC 64.0 LBS " " "	95.634
10:40	–	–	–	–	–	–	LOGGING	
11:48	–	1410	111.7'	252.1'	12.62	–	DISC. 65.0 LBS. CLEAR VERY VERY SMALL AIR	95.907
12:45	–	1400	111.5	251.9'			67.0 LBS DISC. " " " "	96.158
1:15		1395	111.6	252.0'	12.50		68.0 LBS DISC. " " " "	96.282
2:15		1395	111.2	251.6'	12.54		70.0 LBS DISC. " " " "	96.531
2:31		1395	111.2	251.6	12.54	1772	70.5 LBS DISC.	96.600
3:00	DISCONNET POWER @ REMOTE MAIN & TAGGED OFF							
							583,722 GALLON PUMPED	

APPENDIX 2-5: Spinner Log Results for Windsor Well

PACIFIC SURVEYS

SPINNER
DOWN RUNS
PUMPING CONDITION

Job No.
15408

File No.

Company LAYNE CHRISTENSEN
Well WINDSOR
Field ALTADENA
County LOS ANGELES State CA

Location:

2696 WINDSOR AVE
GPS:N34o11'29.8" W118o10'03.1"

Sec. Twp. Rge.

Other Services:

STOP COUNTS
SPINNER ANALYSIS
SAMPLING

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'	K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	8-12-2010
Run Number	ONE
Depth Driller	593'
Depth Logger	591'
Bottom Logged Interval	590'
Top Log Interval	320'
Pump Set @	308'
Time Pumping Prior to Survey	3 HOURS
Pumping Water Level	262'
Max. Recorded Temp.	N/A
Pump Rate (GPM)	1410
Time Well Ready	10:00 AM
Time Logger on Bottom	10:20 AM
Equipment Number	PS-1
Location	L.A.
Recorded By	ABREAU/NELSON
Witnessed By	PORTER

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	316'	591'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	14"	n/a	0'	593'
Liner				

<< Fold Here >>>

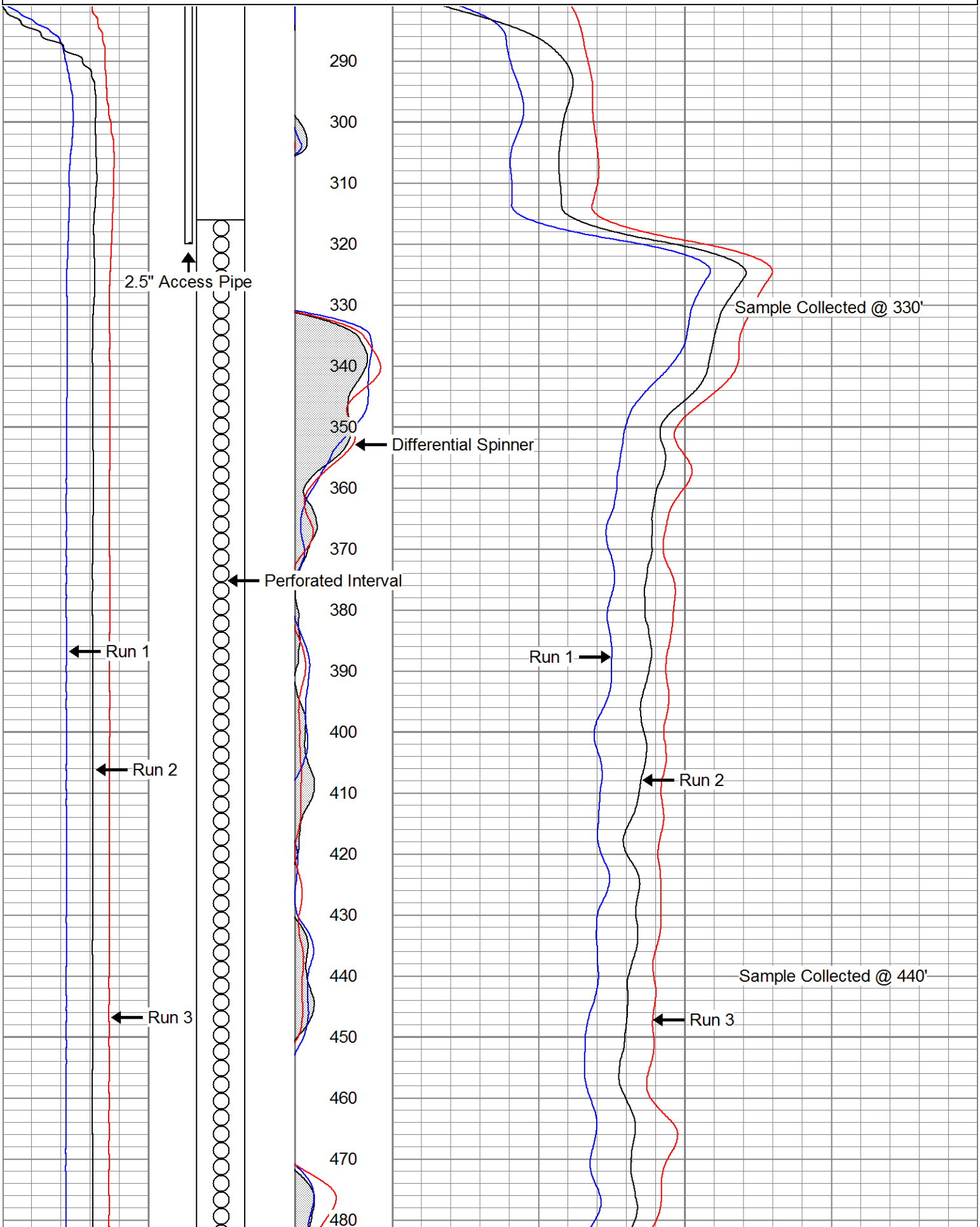
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

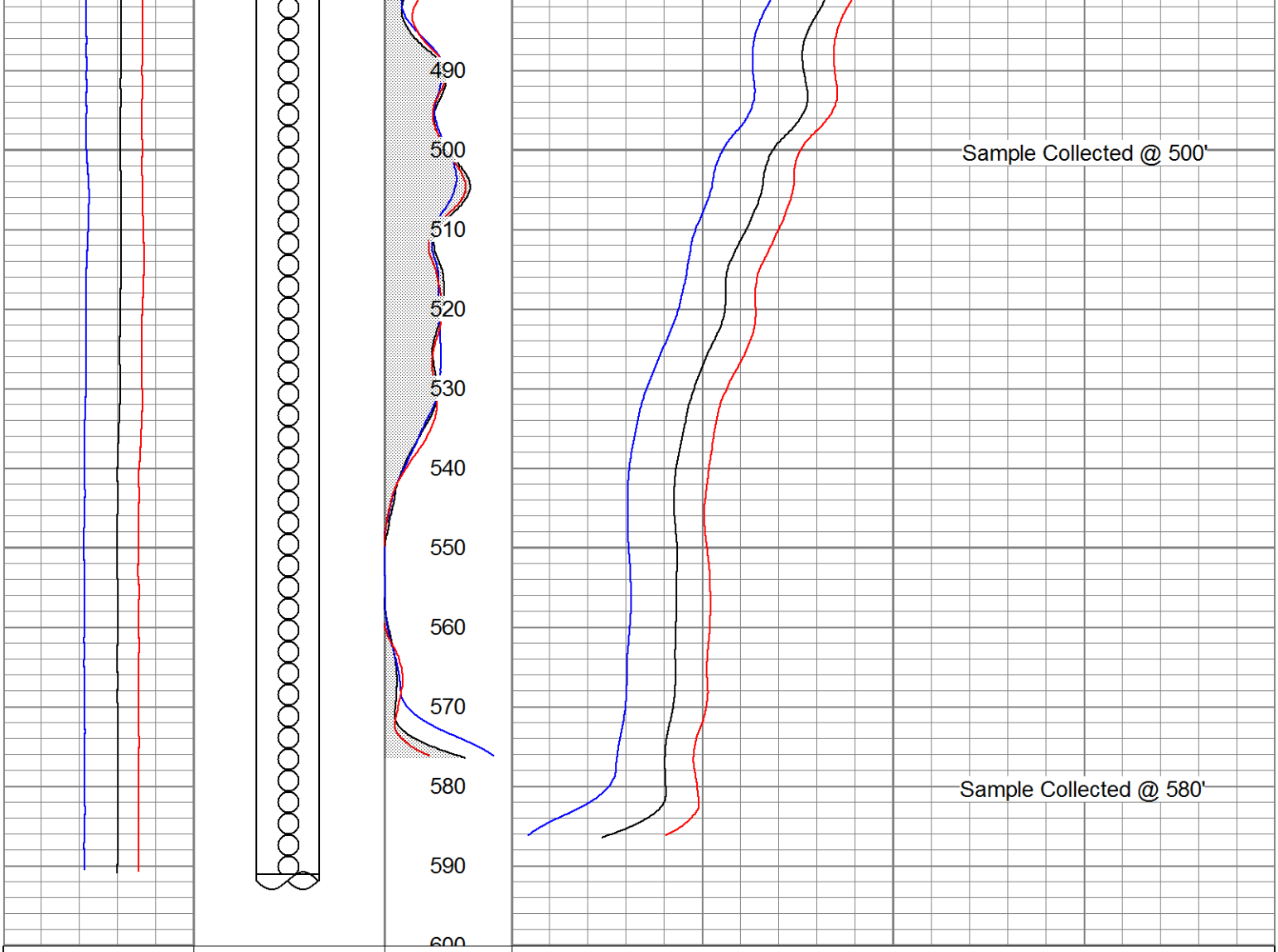
Comments

SAMPLES COLLECTED @ 330', 440', 500', 580'

Database File: 15408.db
Dataset Pathname: spn7
Presentation Format: spinmerg
Dataset Creation: Wed Aug 11 10:44:25 2010 by Log Open-Cased 090629
Charted by: Depth in Feet scaled 1:240

0	LS (ft/min)	200	CSG SCHDL	Delta Spin	0	Spinner Down Run (cps)	200
0	LS (ft/min)	200		Delta Spin	0	Spinner Down Run (cps)	200
0	LS (ft/min)	200		Delta Spin	0	Spinner Down Run (cps)	200





0	LS (ft/min)	200	CSG SCHDL	Delta Spin	0	Spinner Down Run (cps) 200
0	LS (ft/min)	200		Delta Spin	0	Spinner Down Run (cps) 200
0	LS (ft/min)	200		Delta Spin	0	Spinner Down Run (cps) 200

PACIFIC SURVEYS

SPINNER
STOP COUNTS
PUMPING CONDITION

Job No.
15408

File No.

Company LAYNE CHRISTENSEN
Well WINDSOR
Field ALTADENA
County LOS ANGELES State CA

Location:

2696 WINDSOR AVE
GPS:N34o11'29.8" W118o10'03.1"

Sec. Twp. Rge.

Other Services:

DYNAMIC SPINNER
SPINNER ANALYSIS
SAMPLING

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'	K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	8-12-2010		
Run Number	ONE		
Depth Driller	593'		
Depth Logger	591'		
Bottom Logged Interval	590'		
Top Log Interval	320'		
Pump Set @	308'		
Time Pumping Prior to Survey	3 HOURS		
Pumping Water Level	262'		
Max. Recorded Temp.	N/A		
Pump Rate (GPM)	1410		
Time Well Ready	10:00 AM		
Time Logger on Bottom	10:20 AM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	PORTER		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	316'	591'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	14"	n/a	0'	593'
Liner				

<< Fold Here >>>

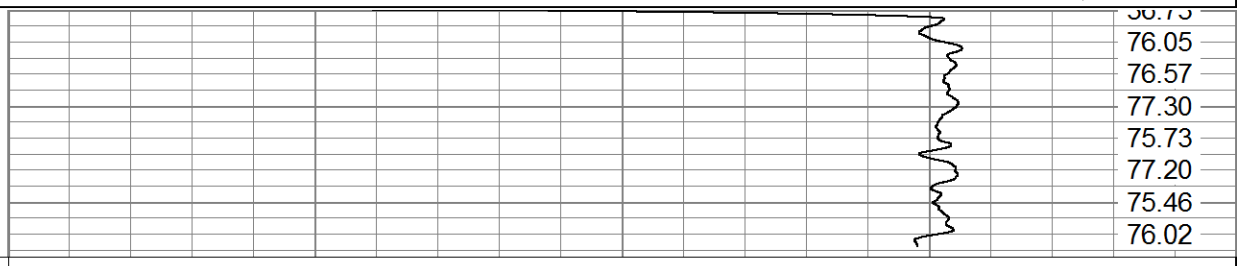
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

Comments

SAMPLES COLLECTED @ 330', 440', 500', 580'

Database File: 15408.db
Dataset Pathname: stop10
Presentation Format: spnstop
Dataset Creation: Wed Aug 11 11:32:30 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

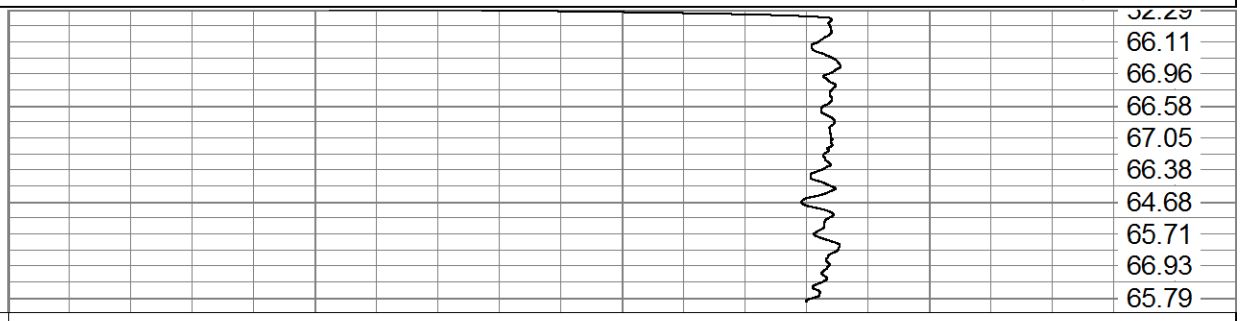
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	322		76.05
			76.57
60	322		77.30
			75.73
			77.20
120	322		75.46
			76.02



Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

Database File: 15408.db
Dataset Pathname: stop9
Presentation Format: spnstop
Dataset Creation: Wed Aug 11 11:28:18 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

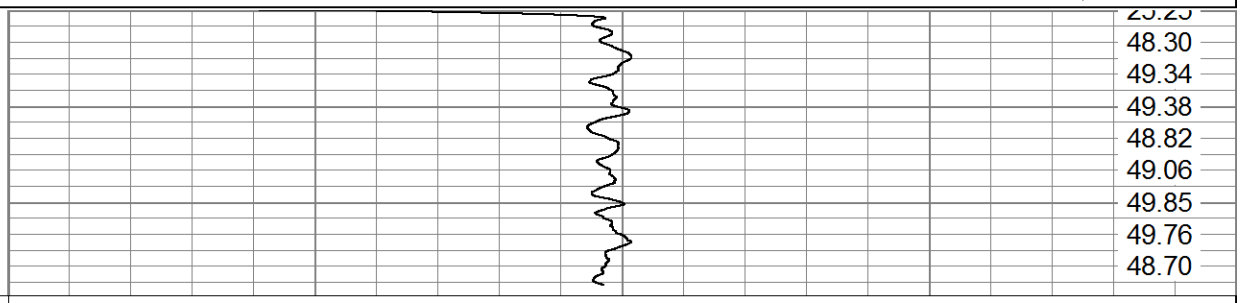
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	335		66.11
			66.96
60	335		66.58
			67.05
			66.38
120	335		64.68
			65.71
			66.93
180	335		65.79



Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

Database File: 15408.db
Dataset Pathname: stop8
Presentation Format: spnstop
Dataset Creation: Wed Aug 11 11:24:33 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	350		48.30
			49.34
60	350		49.38
			48.82
			49.06
120	350		49.85
			49.76
			48.70

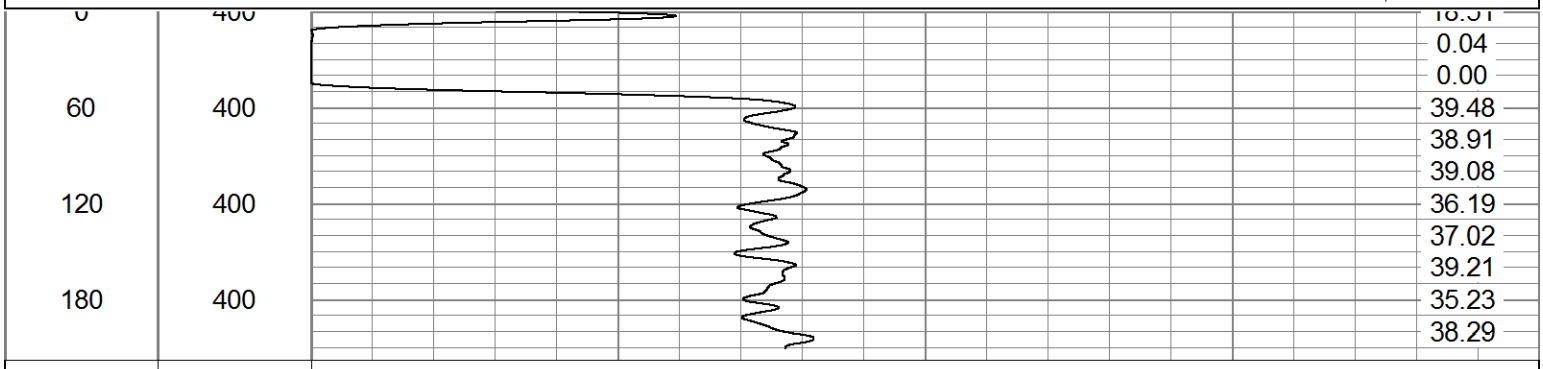


Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100

Time (sec)	Depth (ft)	0	Spinner Stop Count (cps)	100
				Spin Stop (cps)

Database File: 15408.db
Dataset Pathname: stop7
Presentation Format: spnstop
Dataset Creation: Wed Aug 11 11:20:04 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

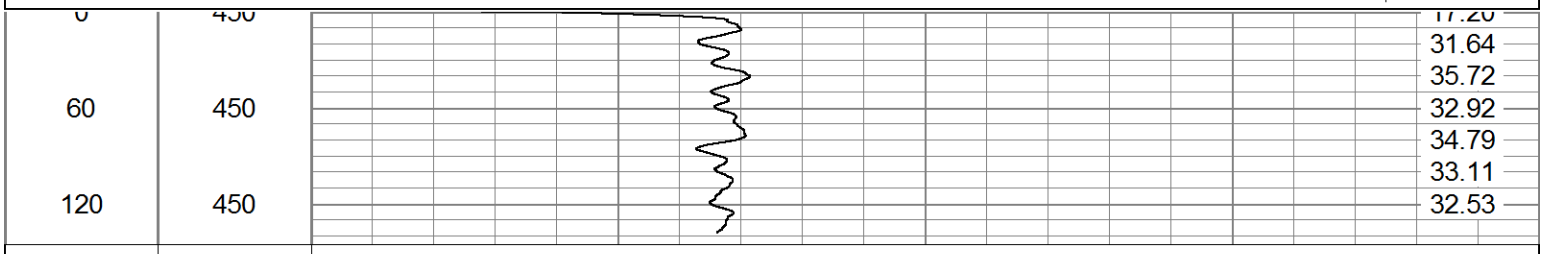
Time (sec)	Depth (ft)	0	Spinner Stop Count (cps)	100
				Spin Stop (cps)



Time (sec)	Depth (ft)	0	Spinner Stop Count (cps)	100
				Spin Stop (cps)

Database File: 15408.db
Dataset Pathname: stop6
Presentation Format: spnstop
Dataset Creation: Wed Aug 11 11:16:54 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0	Spinner Stop Count (cps)	100
				Spin Stop (cps)

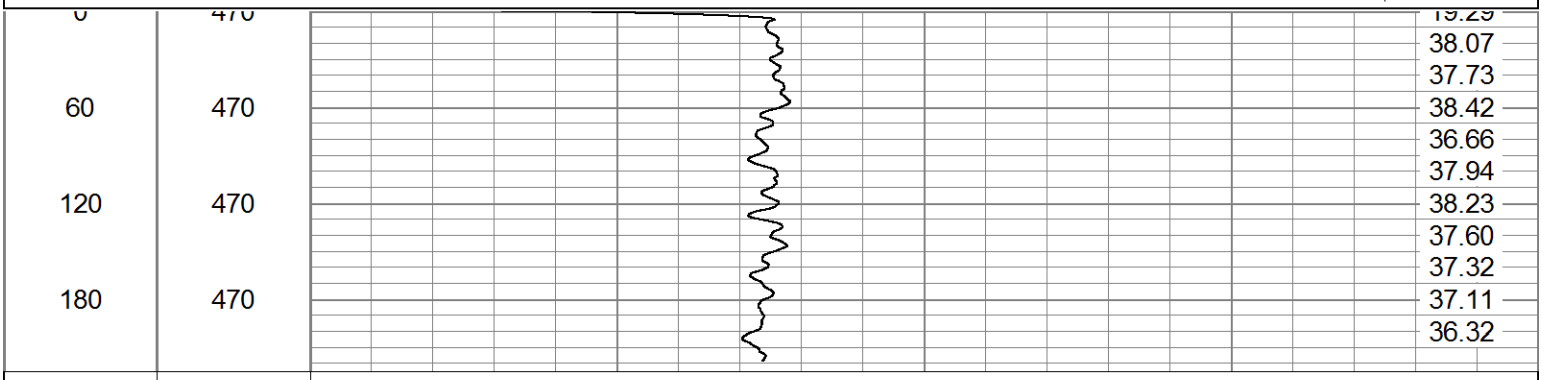


Time (sec)	Depth (ft)	0	Spinner Stop Count (cps)	100
				Spin Stop (cps)

Database File: 15408.db
Dataset Pathname: stop5
Presentation Format: spnstop
Dataset Creation: Wed Aug 11 11:12:31 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0	Spinner Stop Count (cps)	100

Spin Stop (cps)



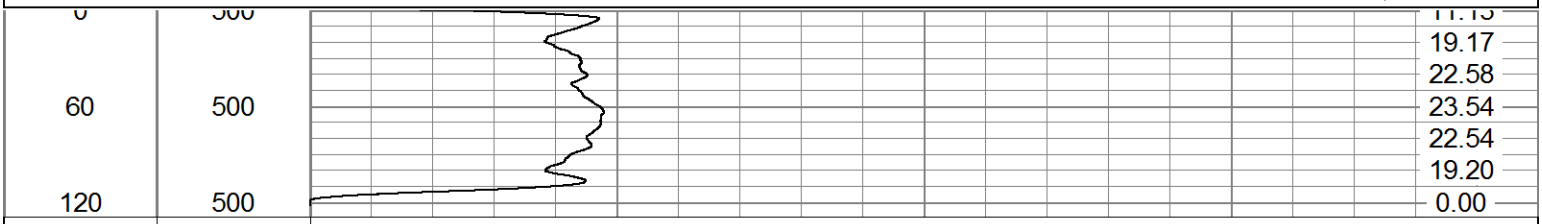
Time (sec)	Depth (ft)	0	Spinner Stop Count (cps)	100

Spin Stop (cps)

Database File: 15408.db
Dataset Pathname: stop4
Presentation Format: spnstop
Dataset Creation: Wed Aug 11 11:09:45 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0	Spinner Stop Count (cps)	100

Spin Stop (cps)



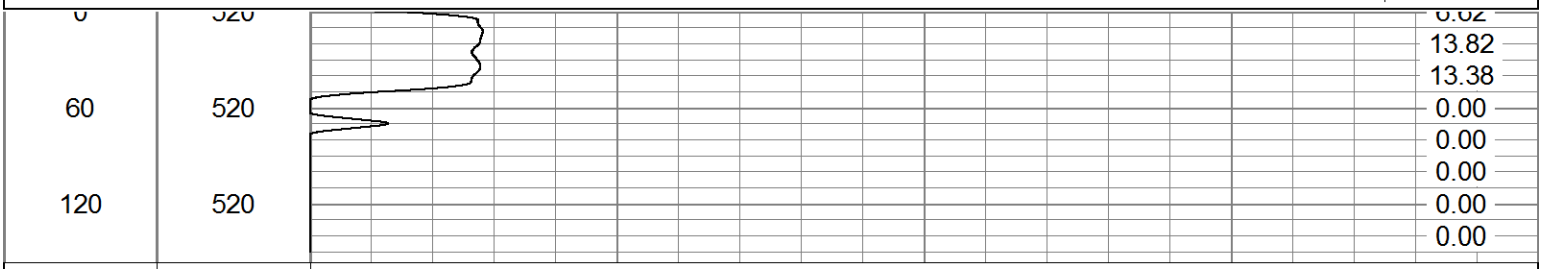
Time (sec)	Depth (ft)	0	Spinner Stop Count (cps)	100

Spin Stop (cps)

Database File: 15408.db
Dataset Pathname: stop3
Presentation Format: spnstop
Dataset Creation: Wed Aug 11 11:06:36 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0	Spinner Stop Count (cps)	100

Spin Stop (cps)



Time (sec)	Depth (ft)	0	Spinner Stop Count (cps)	100

Spin Stop

(cps)

Database File: 15408.db
Dataset Pathname: stop2
Presentation Format: spnstop
Dataset Creation: Wed Aug 11 11:03:27 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	540		0.00
			0.69
			0.00
60	540		0.00
			0.00
			0.00
120	540		0.00
			0.00
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

Database File: 15408.db
Dataset Pathname: stop
Presentation Format: spnstop
Dataset Creation: Wed Aug 11 10:59:15 2010 by Log Open-Cased 090629
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)
0	580		0.00
			0.00
			0.00
60	580		0.00
			0.00
			0.00
120	580		0.00
			0.00
Time (sec)	Depth (ft)	0 Spinner Stop Count (cps) 100	Spin Stop (cps)

PACIFIC SURVEYS

SPINNER
FLUID VELOCITY
SPINNER ANALYSIS
PUMPING CONDITION

Job No.
15408

File No.

Company LAYNE CHRISTENSEN
Well WINDSOR
Field ALTADENA
County LOS ANGELES State CA

Location:

2696 WINDSOR AVE
GPS:N34o11'29.8" W118o10'03.1"

Sec. Twp. Rge.

Other Services:

STOP COUNTS
DYNAMIC SPINNER
SAMPLING

Permanent Datum	G.L.		Elevation above perm. datum	Elevation
Log Measured From	G.L.	0'		K.B.
Drilling Measured From	G.L.			D.F.
				G.L.

Date	8-12-2010		
Run Number	ONE		
Depth Driller	593'		
Depth Logger	591'		
Bottom Logged Interval	590'		
Top Log Interval	320'		
Pump Set @	308'		
Time Pumping Prior to Survey	3 HOURS		
Pumping Water Level	262'		
Max. Recorded Temp.	N/A		
Pump Rate (GPM)	1410		
Time Well Ready	10:00 AM		
Time Logger on Bottom	10:20 AM		
Equipment Number	PS-1		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	PORTER		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Wire-Wrap	.080	316'	591'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	14"	n/a	0'	593'
Liner				

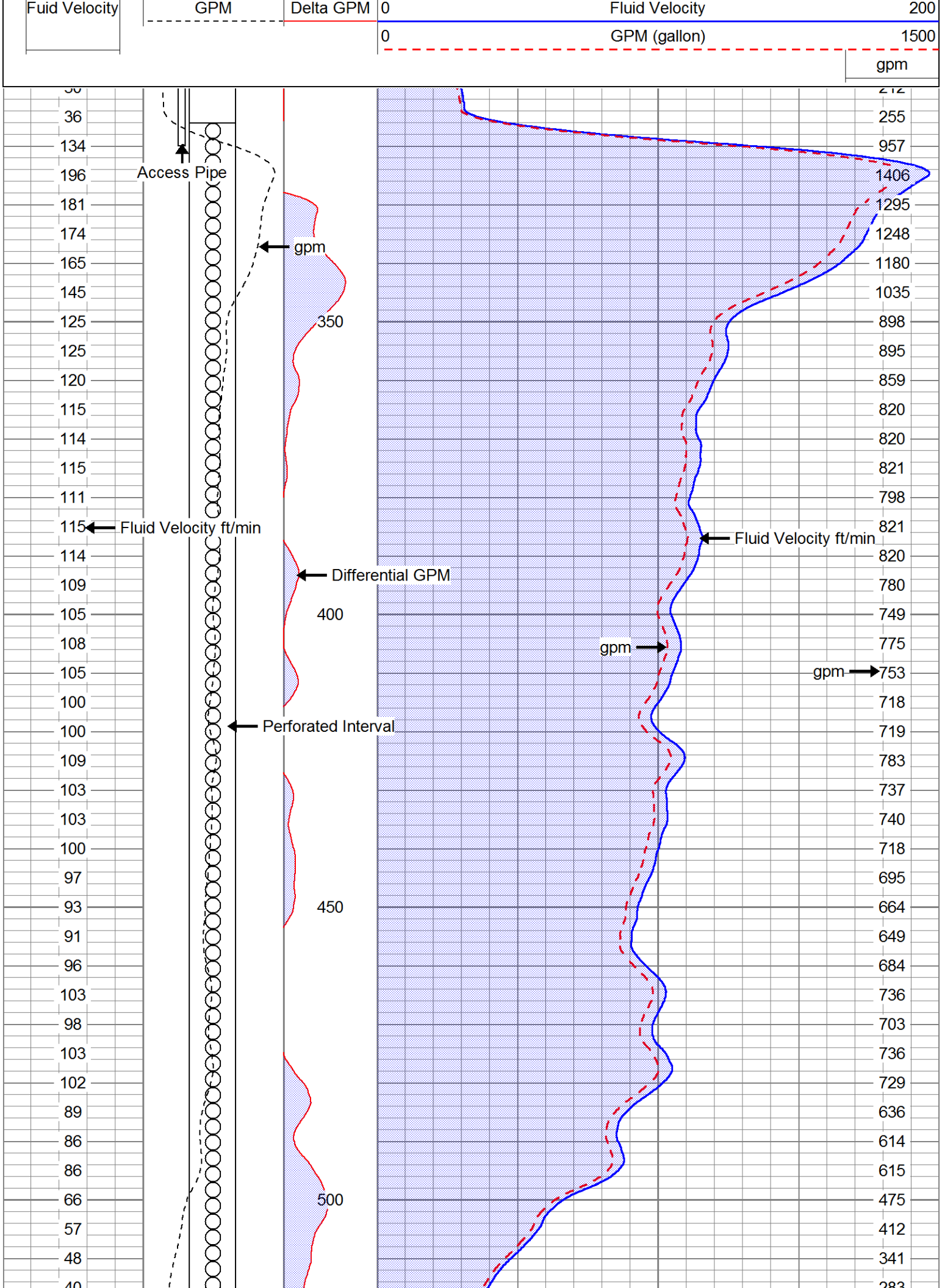
<<< Fold Here >>>

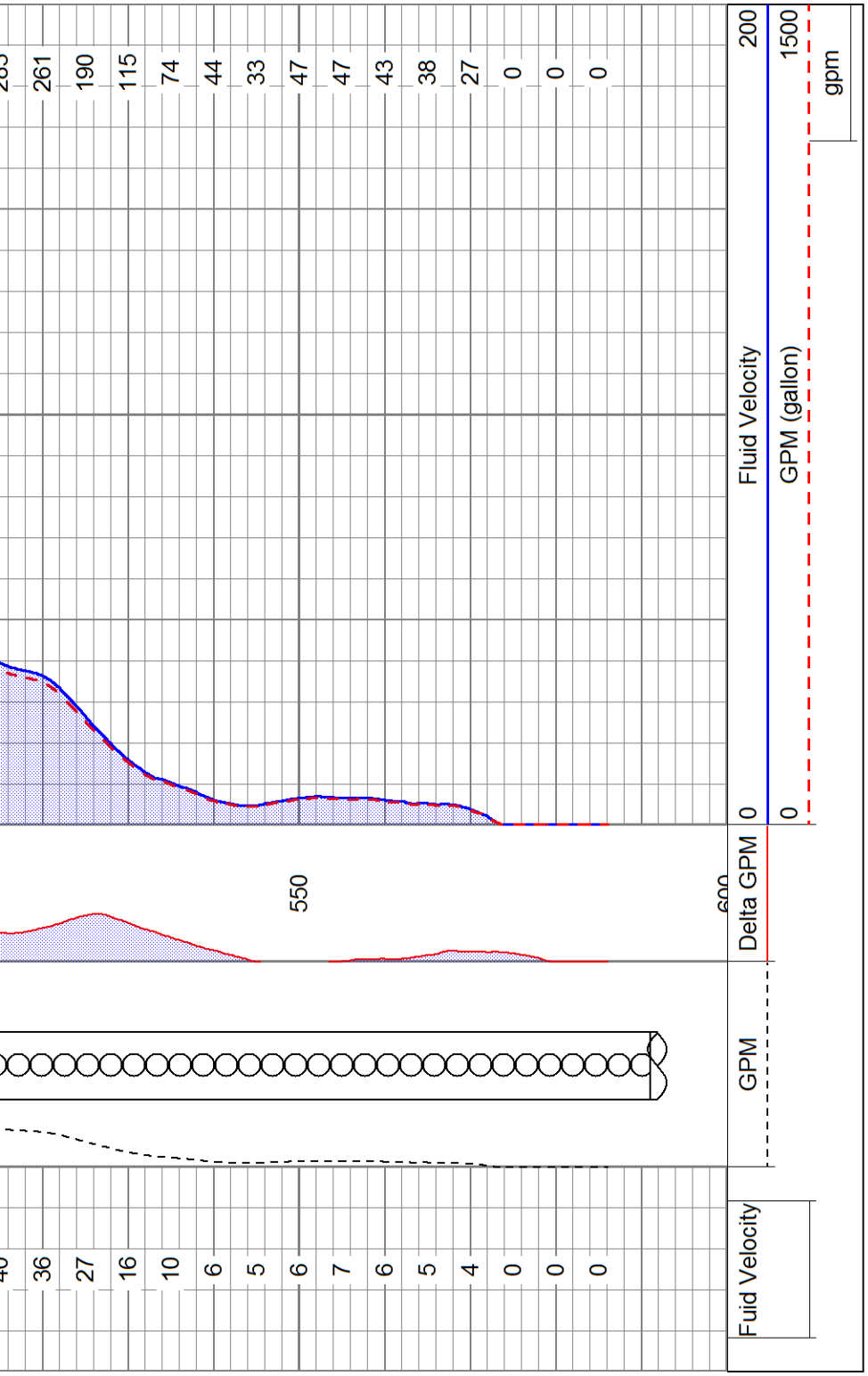
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

Comments

SAMPLES COLLECTED @ 330', 440', 500', 580'

Database File: 15408.db
Dataset Pathname: 15408fld
Presentation Format: spinmerg
Dataset Creation: Fri Aug 27 14:22:36 2010
Charted by: Depth in Feet scaled 1:240


Fuid Velocity
GPM
Delta GPM
0
Fluid Velocity
200
0
GPM (gallon)
1500
gpm
Access Pipe
gpm
350
Fluid Velocity ft/min
Differential GPM
400
gpm
Perforated Interval
450
500
Fluid Velocity ft/min
gpm



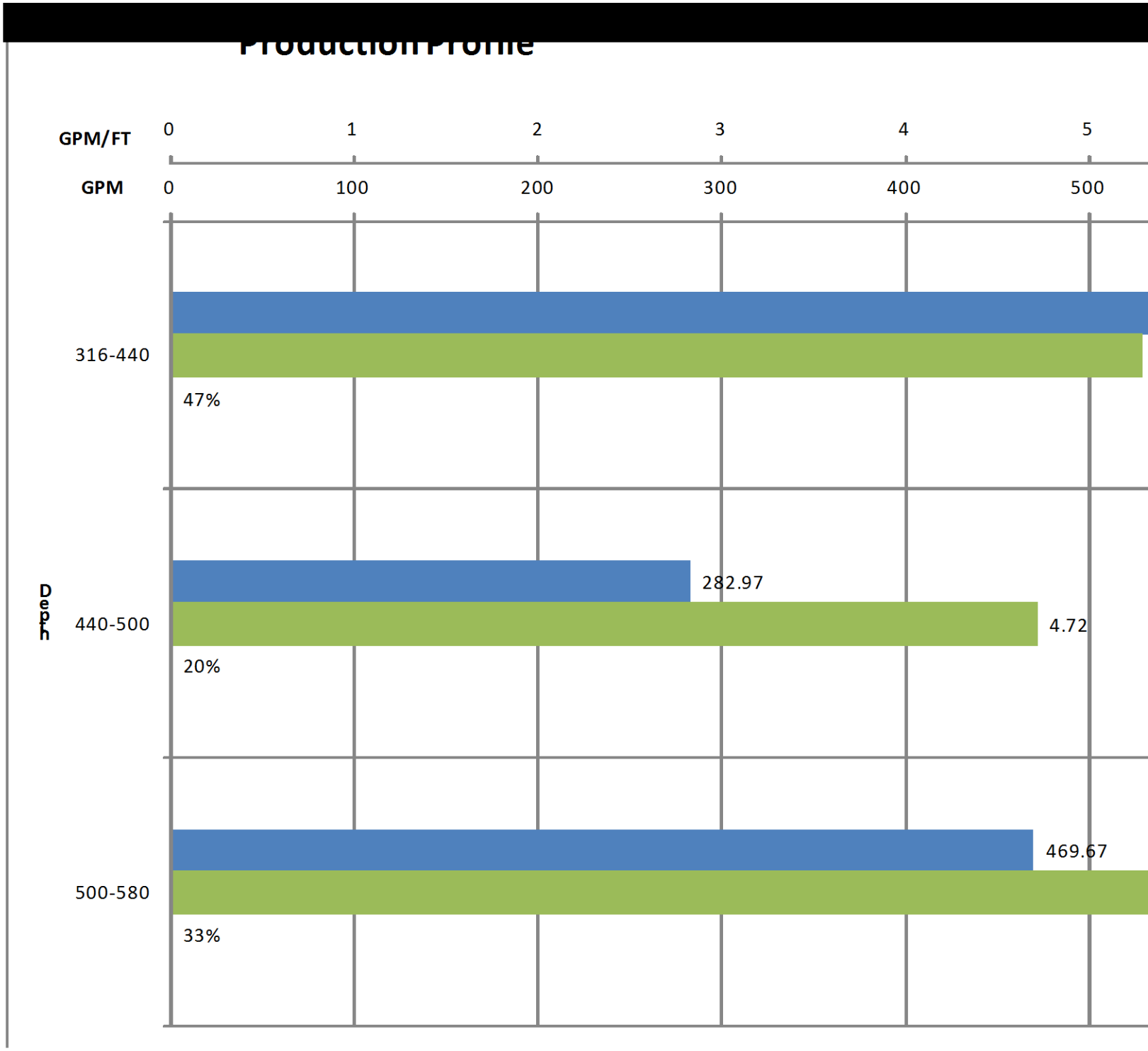
SPINNER LOG ANALYSIS

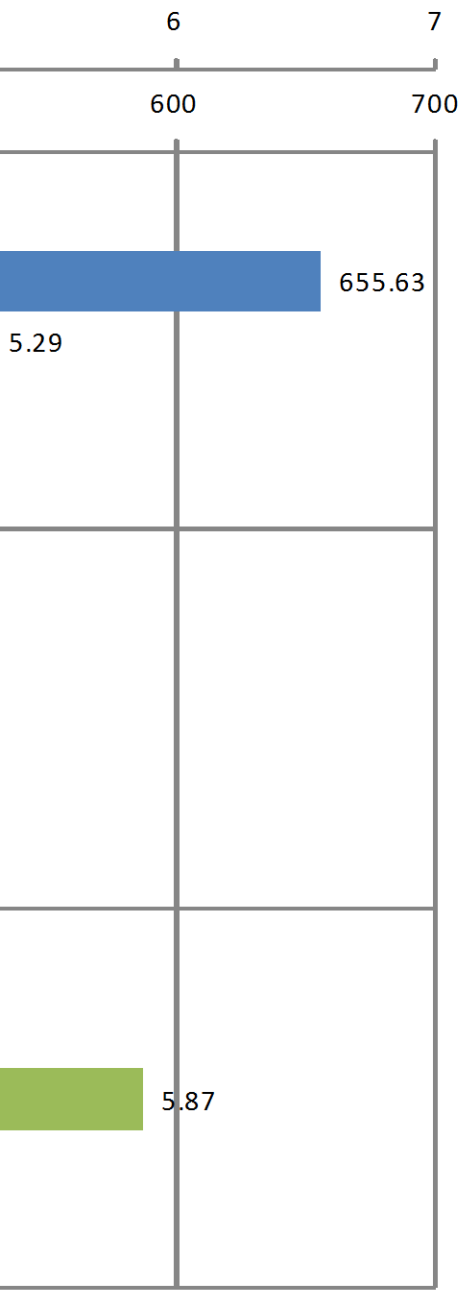
MAX
FLOW RATE 1408.27 GPM

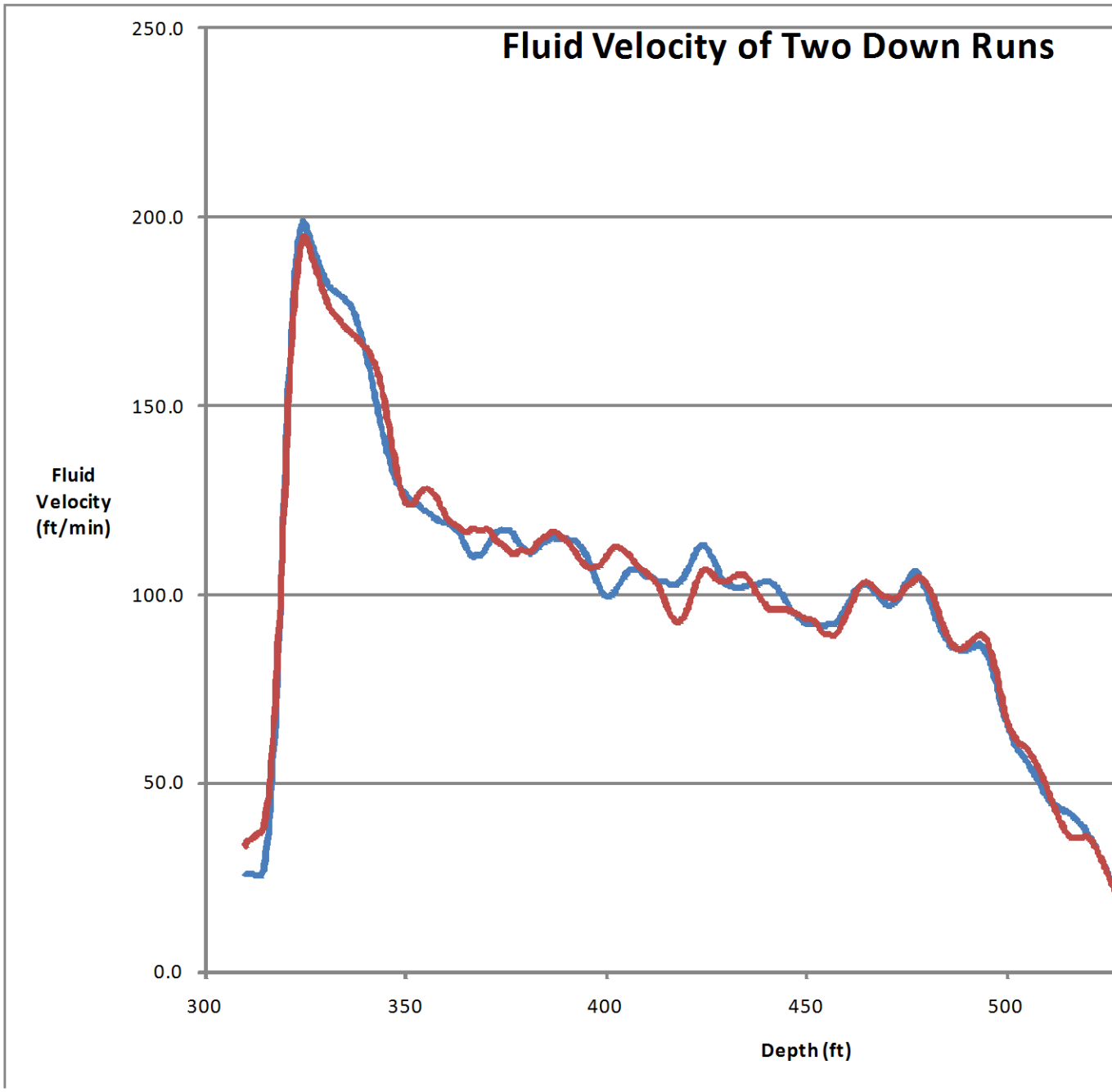
PERFS DEPTHS	PRODUCTION GPM	% OF FLOW ZONES	GP
316-440	655.63	47%	5
440-500	282.97	20%	4
500-580	469.67	33%	5

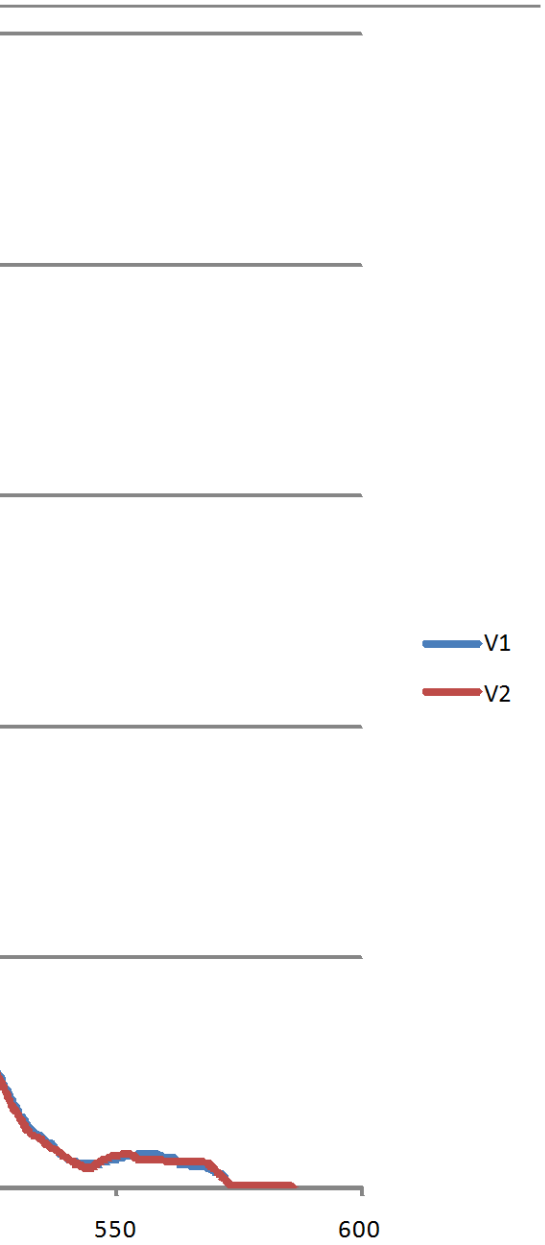
Pacific Surveys

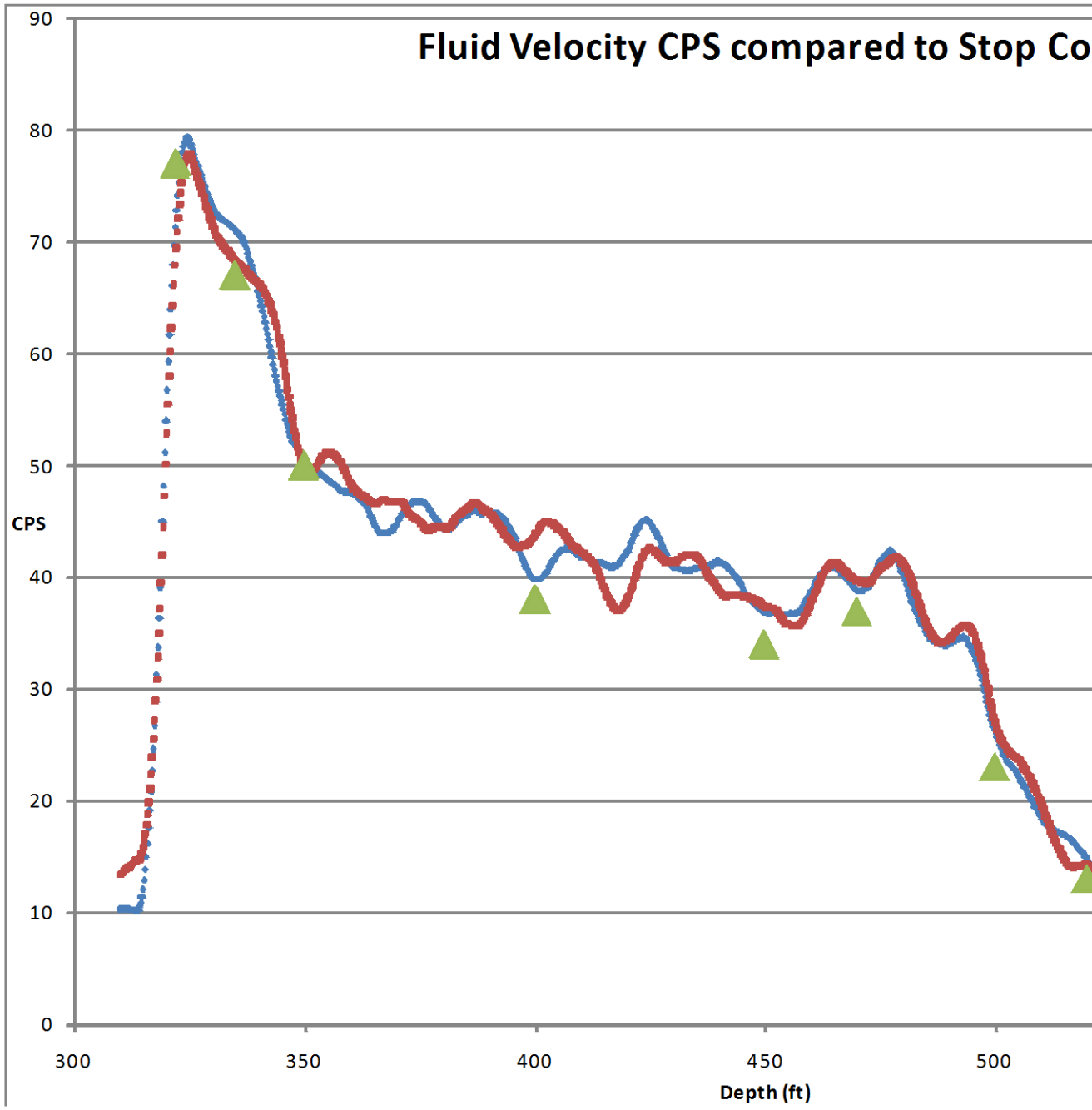
M/FT	THICKNESS ft
.29	124
.72	60
.87	80



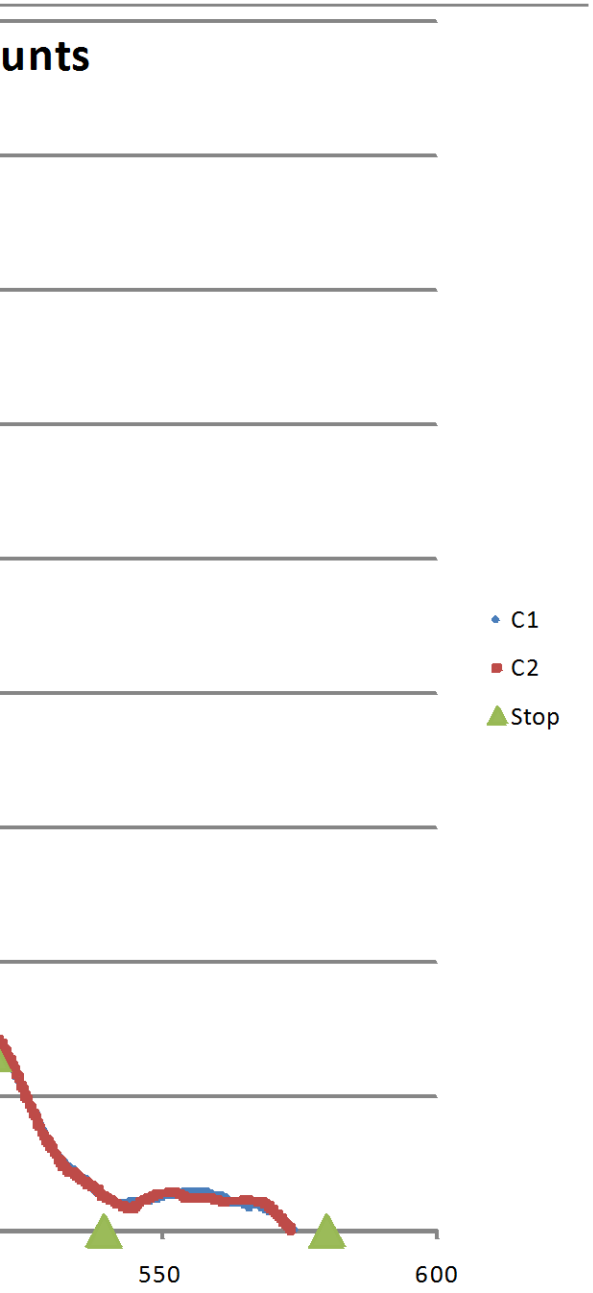

6
7
600
700
655.63
5.29
5.87


Fluid Velocity of Two Down Runs
250.0
200.0
150.0
100.0
50.0
0.0
Fluid Velocity (ft/min)
300
350
400
450
500
Depth (ft)


V1
V2
550
600


Fluid Velocity CPS compared to Stop Co
90
80
70
60
50
40
30
20
10
0
CPS
300
350
400
450
500
Depth (ft)

[redacted]



PACIFIC SURVEYS

SPINNER
DOWN & UP RUNS
NON-PUMPING CONDITION

Job No. 15802

File No.

Company BATTELLE INSTITUTE

Well WINDSOR

Field ALTADENA

County LOS ANGELES State CA

Location:

2696 WINDSOR AVE.
GPS: N34o 11' 29.8" W118o 10' 03.1"

Sec. Twp. Rge.

Other Services:

VIDEO SURVEY
CITM
NOISE/TEMP

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	Top of Casing		K.B.
Drilling Measured From	N/A		D.F.
			G.L.

Date	03-09-2011		
Run Number	ONE		
Depth Driller	600'		
Depth Logger	592'		
Bottom Logged Interval	592'		
Top Log Interval	140'		
Pump Set @	N/A		
Time Pumping Prior to Survey	N/A		
Pumping Water Level	N/A		
Max. Recorded Temp.	65.4 F		
Pump Rate (GPM)	N/A		
Time Well Ready	08:00		
Time Logger on Bottom	08:30		
Equipment Number	PS-4		
Location	L.A.		
Recorded By	RIDDER		
Witnessed By	D. CONNORS		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Hydr-Louver	N/A	320'	344'	Hydr-Louver	N/A	497'	585'
Hydr-Louver	N/A	374'	384'				
Hydr-Louver	N/A	426'	450'				
Hydr-Louver	N/A	474'	485'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	20"	71 lbs/ft	0'	600'
Liner	14"	47lbs/ft	0'	600'

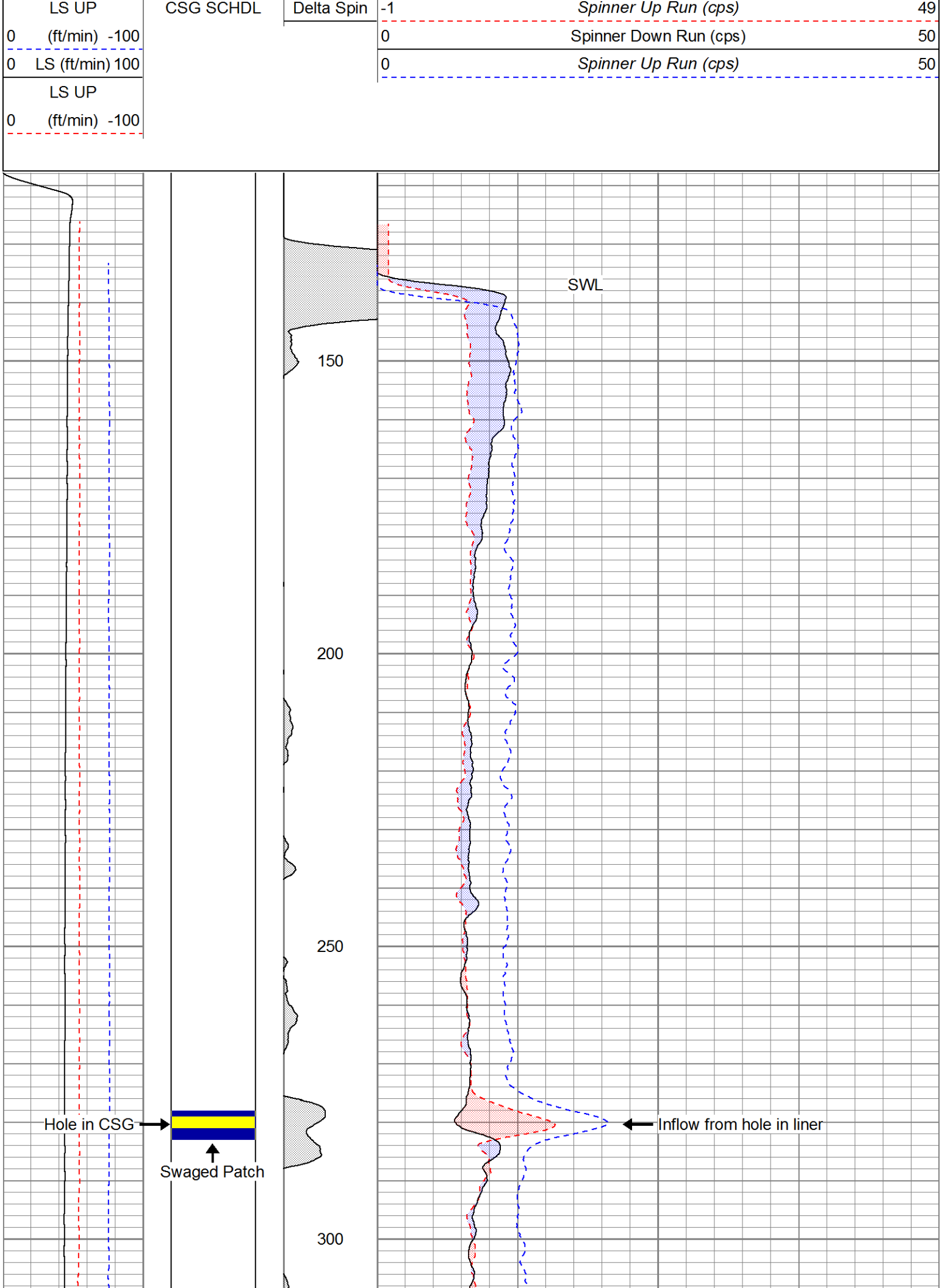
<< Fold Here >>>

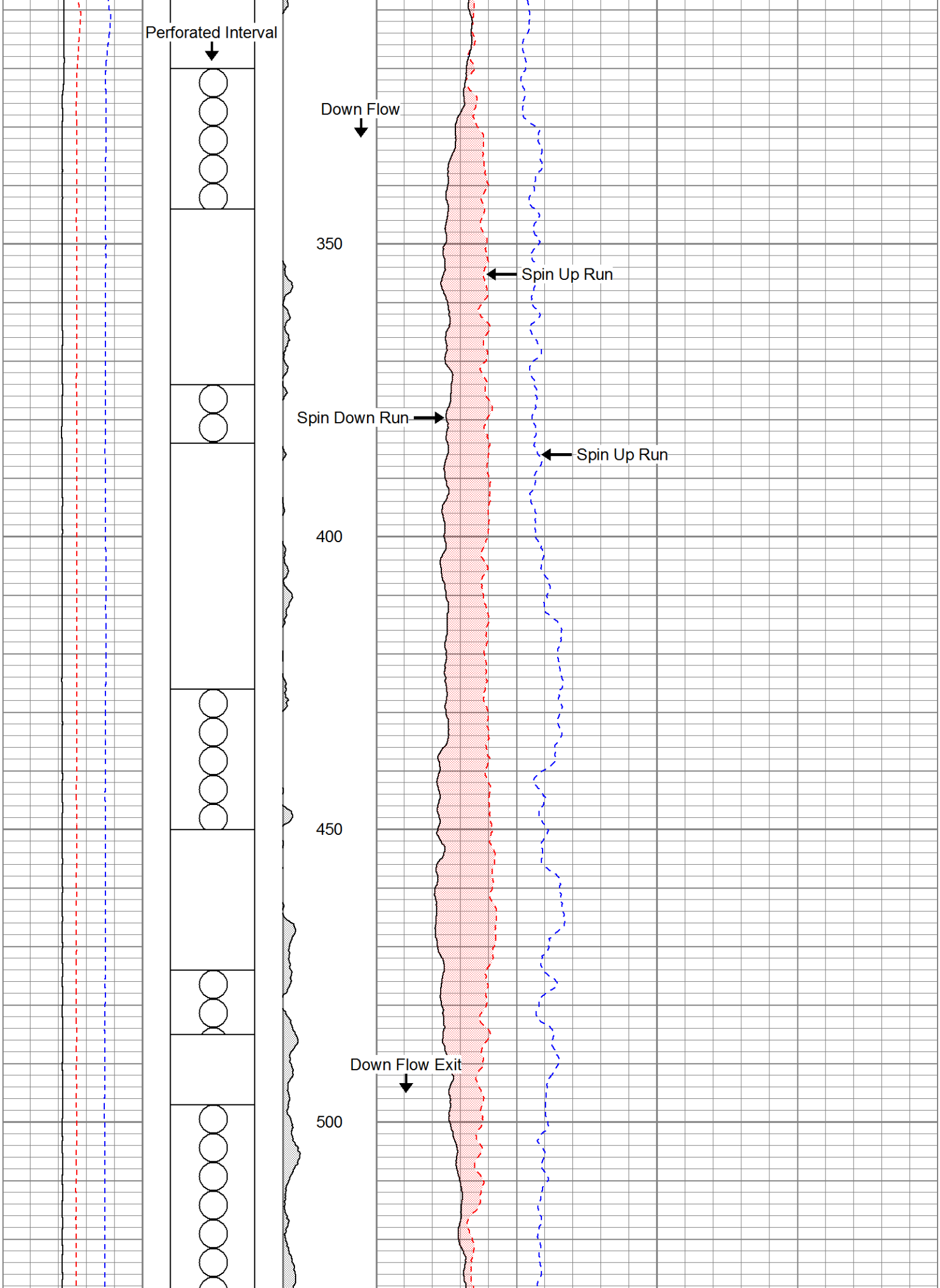
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

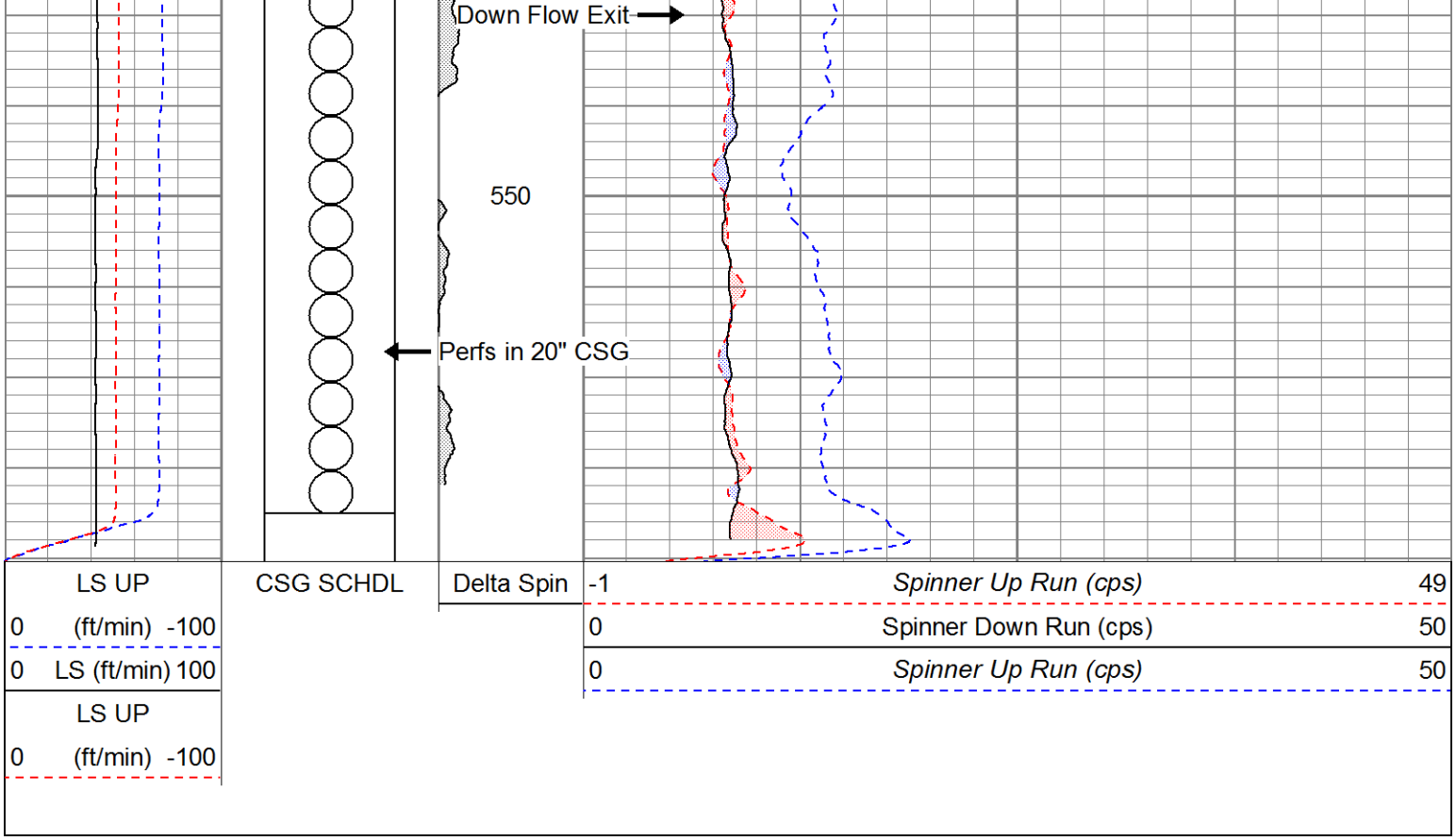
Comments

The casing schedule in the well sketch is based on the original well designed. The liner has SST wire-wrap screen from 325 to 595'

Database File: 15802_spin.db
Dataset Pathname: spn_dwn
Presentation Format: spinmerg
Dataset Creation: Wed Mar 16 10:19:36 2011
Charted by: Depth in Feet scaled 1:240


LS UP
0 (ft/min) -100
0 LS (ft/min) 100
LS UP
0 (ft/min) -100
CSG SCHDL
Delta Spin
-1 Spinner Up Run (cps) 49
0 Spinner Down Run (cps) 50
0 Spinner Up Run (cps) 50
SWL
150
200
250
300
Hole in CSG
Swaged Patch
Inflow from hole in liner


Perforated Interval
Down Flow
350
Spin Up Run
Spin Down Run
Spin Up Run
400
450
Down Flow Exit
500


Down Flow Exit
550
Perfs in 20" CSG
LS UP
0 (ft/min) -100
0 LS (ft/min) 100
LS UP
0 (ft/min) -100
CSG SCHDL
Delta Spin
-1
Spinner Up Run (cps)
49
0
Spinner Down Run (cps)
50
0
Spinner Up Run (cps)
50

PACIFIC SURVEYS

SPINNER
STOP COUNTS
NON-PUMPING CONDITION

Job No. 15802

File No.

Company BATTELLE INSTITUTE

Well WINDSOR

Field ALTADENA

County LOS ANGELES State CA

Location:

2696 WINDSOR AVE.
GPS: N34o 11' 29.8" W118o 10' 03.1"

Sec. Twp. Rge.

Other Services:

VIDEO SURVEY
CITM
NOISE/TEMP

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	Top of Casing		K.B.
Drilling Measured From	N/A		D.F.
			G.L.

Date	03-09-2011		
Run Number	ONE		
Depth Driller	600'		
Depth Logger	592'		
Bottom Logged Interval	592'		
Top Log Interval	140'		
Pump Set @	N/A		
Time Pumping Prior to Survey	N/A		
Pumping Water Level	N/A		
Max. Recorded Temp.	65.4 F		
Pump Rate (GPM)	N/A		
Time Well Ready	08:00		
Time Logger on Bottom	08:30		
Equipment Number	PS-4		
Location	L.A.		
Recorded By	RIDDER		
Witnessed By	D. CONNORS		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Hydr-Louver	N/A	320'	344'	Hydr-Louver	N/A	497'	585'
Hydr-Louver	N/A	374'	384'				
Hydr-Louver	N/A	426'	450'				
Hydr-Louver	N/A	474'	485'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	20"	71 lbs/ft	0'	600'
Liner	14"	47lbs/ft	0'	600'

<< Fold Here >>>

All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

Comments

The casing schedule in the well sketch is based on the original well designed. The liner has SST wire-wrap screen from 325 to 595'

Database File: 15802_spin.db
Dataset Pathname: stop2
Presentation Format: spnstop
Dataset Creation: Wed Mar 16 10:19:34 2011
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count Down Flow (cps) 40	Spin Stop (cps)
0	280		0.00
60	280		0.00
			0.00
			0.00
Time (sec)	Depth (ft)	0 Spinner Stop Count Down Flow (cps) 40	Spin Stop (cps)

Database File: 15802_spin.db
Dataset Pathname: stop
Presentation Format: spnstop
Dataset Creation: Wed Mar 16 10:19:34 2011
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count Down Flow (cps) 40	Spin Stop (cps)
0	282		0.01
			2.36
60	282		1.63
			0.32
120	282		2.22
			1.77
180	282		0.11
			0.52
Time (sec)	Depth (ft)	0 Spinner Stop Count Down Flow (cps) 40	Spin Stop (cps)

Database File: 15802_spin.db
Dataset Pathname: stop4
Presentation Format: spnstop
Dataset Creation: Wed Mar 16 10:19:33 2011
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count Down Flow (cps) 40	Spin Stop (cps)
0	300		0.00
			0.00
60	300		0.00
			0.00
120	300		0.00
Time (sec)	Depth (ft)	0 Spinner Stop Count Down Flow (cps) 40	Spin Stop

(cps)

Database File: 15802_spin.db
Dataset Pathname: stop5
Presentation Format: spnstop
Dataset Creation: Wed Mar 16 10:19:33 2011
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count Down Flow (cps) 40	Spin Stop (cps)
0	310		0.00
			0.00
60	310		0.00
			0.00

Time (sec)	Depth (ft)	0 Spinner Stop Count Down Flow (cps) 40	Spin Stop (cps)

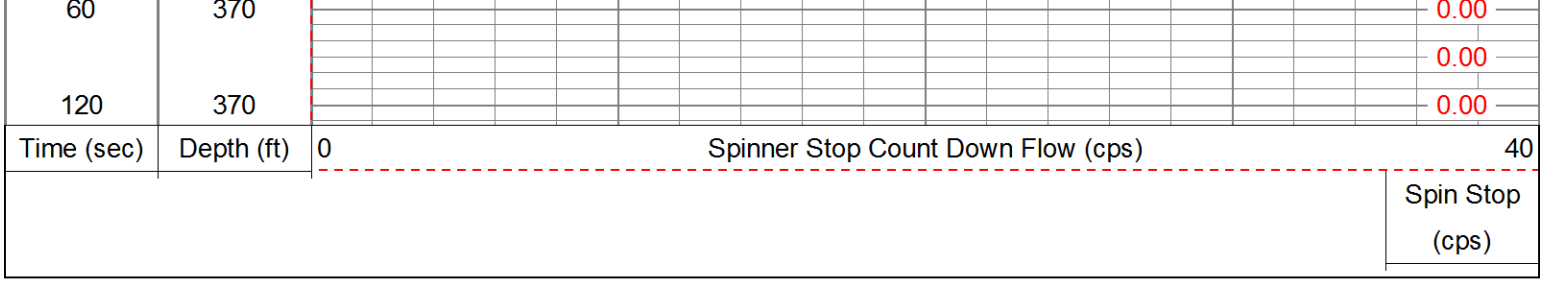
Database File: 15802_spin.db
Dataset Pathname: stop6
Presentation Format: spnstop
Dataset Creation: Wed Mar 16 10:19:33 2011
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count Down Flow (cps) 40	Spin Stop (cps)
0	340		0.00
			0.00
60	340		0.00
			0.00

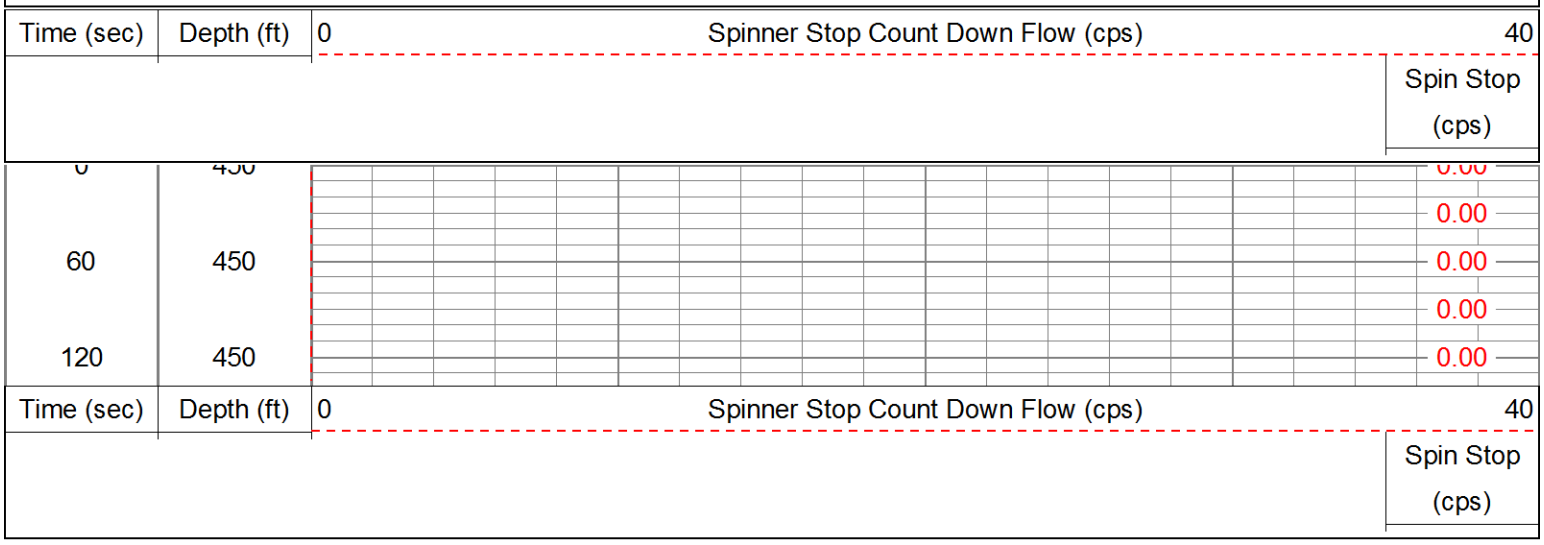
Time (sec)	Depth (ft)	0 Spinner Stop Count Down Flow (cps) 40	Spin Stop (cps)

Database File: 15802_spin.db
Dataset Pathname: stop7
Presentation Format: spnstop
Dataset Creation: Wed Mar 16 10:19:33 2011
Charted by: Time scaled 30"/hour

Time (sec)	Depth (ft)	0 Spinner Stop Count Down Flow (cps) 40	Spin Stop (cps)
0	370		0.00
			0.00



Database File: 15802_spin.db
Dataset Pathname: stop8
Presentation Format: spnstop
Dataset Creation: Wed Mar 16 10:19:33 2011
Charted by: Time scaled 30"/hour



PACIFIC SURVEYS

CASING INSPECTION LOG

Job No. 15802

File No.

Company BATTELLE INSTITUTE

Well WINDSOR

Field ALTADENA

County LOS ANGELES State CA

Location:

2696 WINDSOR AVE.
GPS: N34o 11' 29.8" W118o 10' 03.1"

Sec. Twp. Rge.

Other Services:

VIDEO SURVEY
NOISE/TEMP
SPINNER

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	Top of Casing		K.B.
Drilling Measured From	N/A		D.F.
			G.L.

Date	03-09-2011		
Run Number	ONE		
Depth Driller	600'		
Depth Logger	592'		
Bottom Logged Interval	592'		
Top Log Interval	140'		
Pump Set @	N/A		
Time Pumping Prior to Survey	N/A		
Pumping Water Level	N/A		
Max. Recorded Temp.	65.4 F		
Pump Rate (GPM)	N/A		
Time Well Ready	08:00		
Time Logger on Bottom	08:30		
Equipment Number	PS-4		
Location	L.A.		
Recorded By	RIDDER		
Witnessed By	D. CONNORS		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Hydr-Louver	N/A	320'	344'	Hydr-Louver	N/A	497'	585'
Hydr-Louver	N/A	374'	384'				
Hydr-Louver	N/A	426'	450'				
Hydr-Louver	N/A	474'	485'				

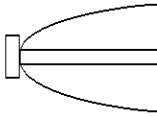
Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	20"	71 lbs/ft	0'	600'
Liner	14"	47lbs/ft	0'	600'

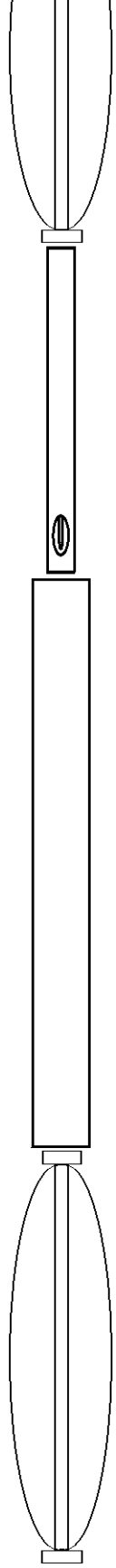
<<< Fold Here >>>

All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

Comments

The casing schedule in the well sketch is based on the original well designed. The liner has SST wire-wrap screen from 325 to 595'

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
						



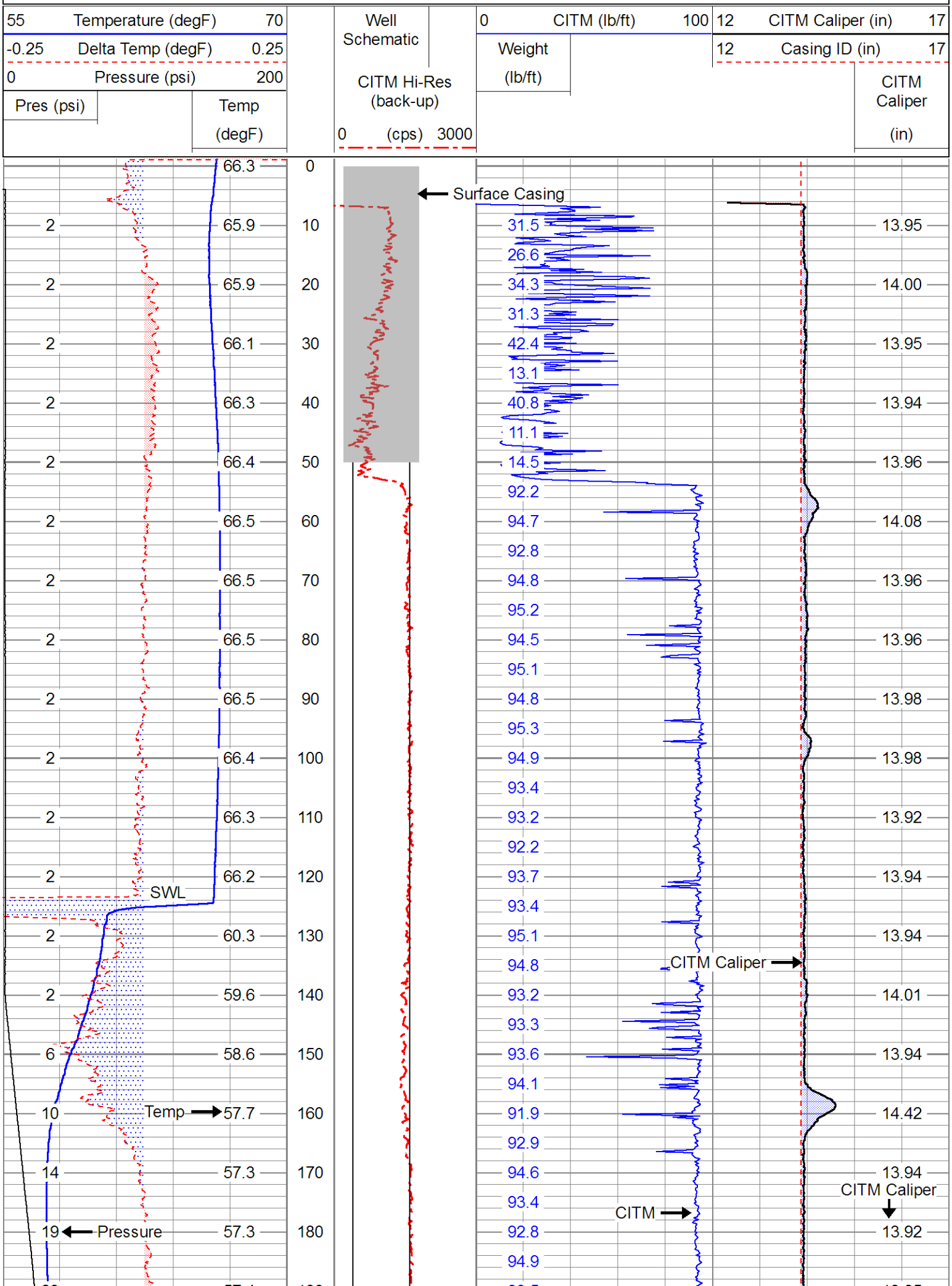
TOP AES Six Spring Centralizer	2.92	1.60	15.00
CBGPT-B (203) CITM Combo Tool for Water Wells	2.54	1.69	6.00
CBGCITM-A (100) Casing Inspection/Caliper	4.38	8.65	170.00
BOTTOM AES Six Spring Bottom	3.17	1.60	15.00

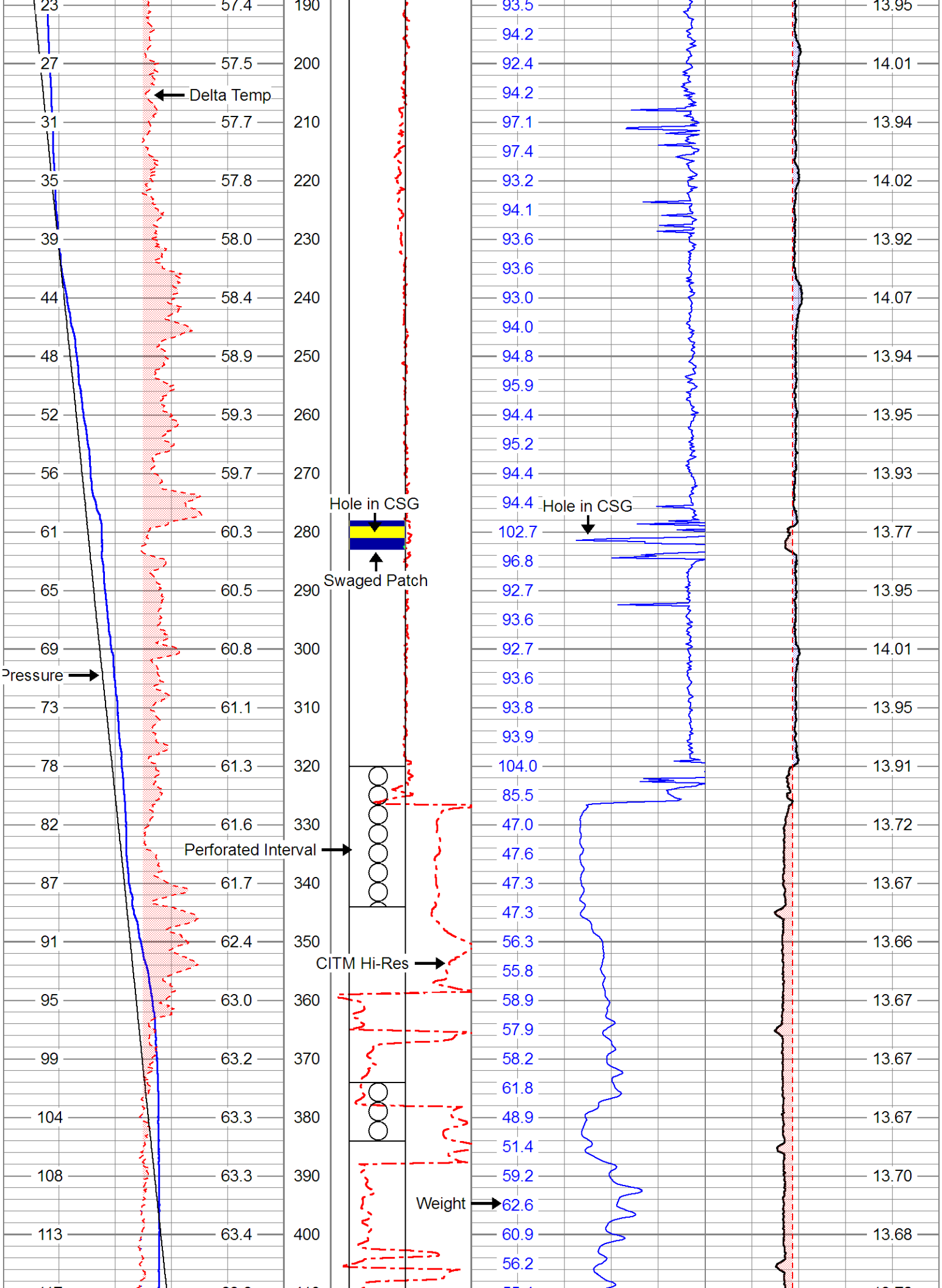
PTEMP	7.88
PRES	7.88
HEAD_V	7.88
V10	7.88
TEMP	7.75
CITM_DIA	5.40
CITM_CIT	5.21
CITM_ICL	4.91

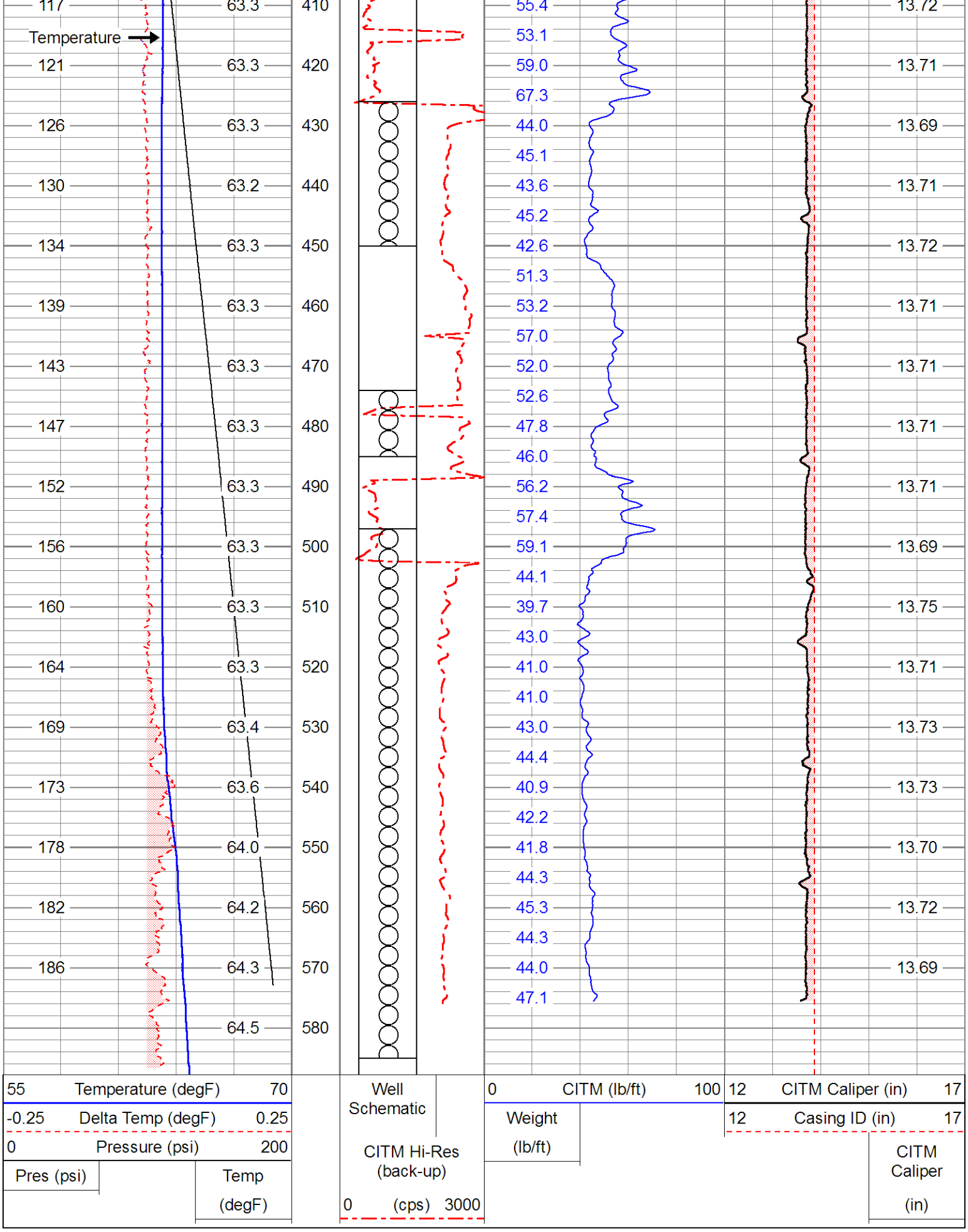
Dataset:	15802b.db: field/well/run1/CITMD3.1
Total Length:	13.00 ft
Total Weight:	206.00 lb
O.D.	8.65 in

Database File:	15802b.db
Dataset Pathname:	CITMD3.1
Presentation Format:	citm
Dataset Creation:	Sat Mar 19 11:51:34 2011 by Calc Open-Cased 100827
Charted by:	Depth in Feet scaled 1:240

Charted by: Depth in Feet scaled 1:240




Delta Temp
Pressure
Hole in CSG
Swaged Patch
Perforated Interval
CITM Hi-Res
Weight
Hole in CSG


Temperature
55 Temperature (degF) 70
-0.25 Delta Temp (degF) 0.25
0 Pressure (psi) 200
Pres (psi)
Temp (degF)
Well Schematic
CITM Hi-Res (back-up)
0 (cps) 3000
0 CITM (lb/ft) 100
Weight (lb/ft)
12 CITM Caliper (in) 17
12 Casing ID (in) 17
CITM Caliper (in)

PACIFIC SURVEYS

NOISE LOG
TEMPERATURE
NON-PUMPING CONDITION

Job No.
15802

File No.

Company BATTELLE INSTITUTE
Well WINDSOR
Field ALTADENA
County LOS ANGELES State CA

Location:

2696 WINDSOR AVE.
GPS: N34o 11' 29.8" W118o 10' 03.1"

Sec. Twp. Rge.

Other Services:

VIDEO SURVEY
CITM
SPINNER

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	Top of Casing		K.B.
Drilling Measured From	N/A		D.F.
			G.L.

Date	03-09-2011		
Run Number	ONE		
Depth Driller	600'		
Depth Logger	592'		
Bottom Logged Interval	592'		
Top Log Interval	140'		
Pump Set @	N/A		
Time Pumping Prior to Survey	N/A		
Pumping Water Level	N/A		
Max. Recorded Temp.	65.4 F		
Pump Rate (GPM)	N/A		
Time Well Ready	08:00		
Time Logger on Bottom	08:30		
Equipment Number	PS-4		
Location	L.A.		
Recorded By	RIDDER		
Witnessed By	D. CONNORS		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
Hydr-Louver	N/A	320'	344'	Hydr-Louver	N/A	497'	585'
Hydr-Louver	N/A	374'	384'				
Hydr-Louver	N/A	426'	450'				
Hydr-Louver	N/A	474'	485'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	20"	71 lbs/ft	0'	600'
Liner	14"	47lbs/ft	0'	600'

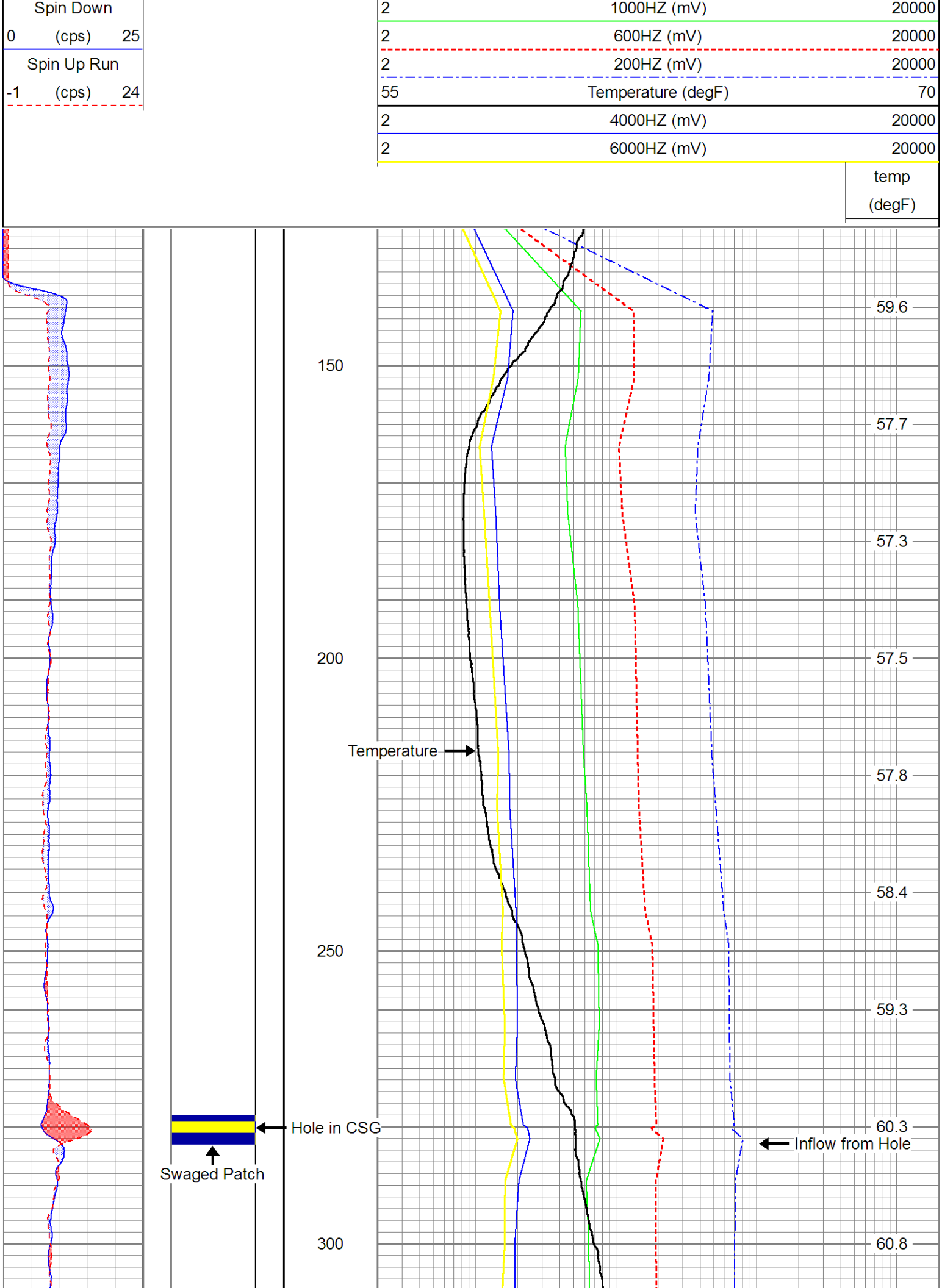
<<< Fold Here >>>

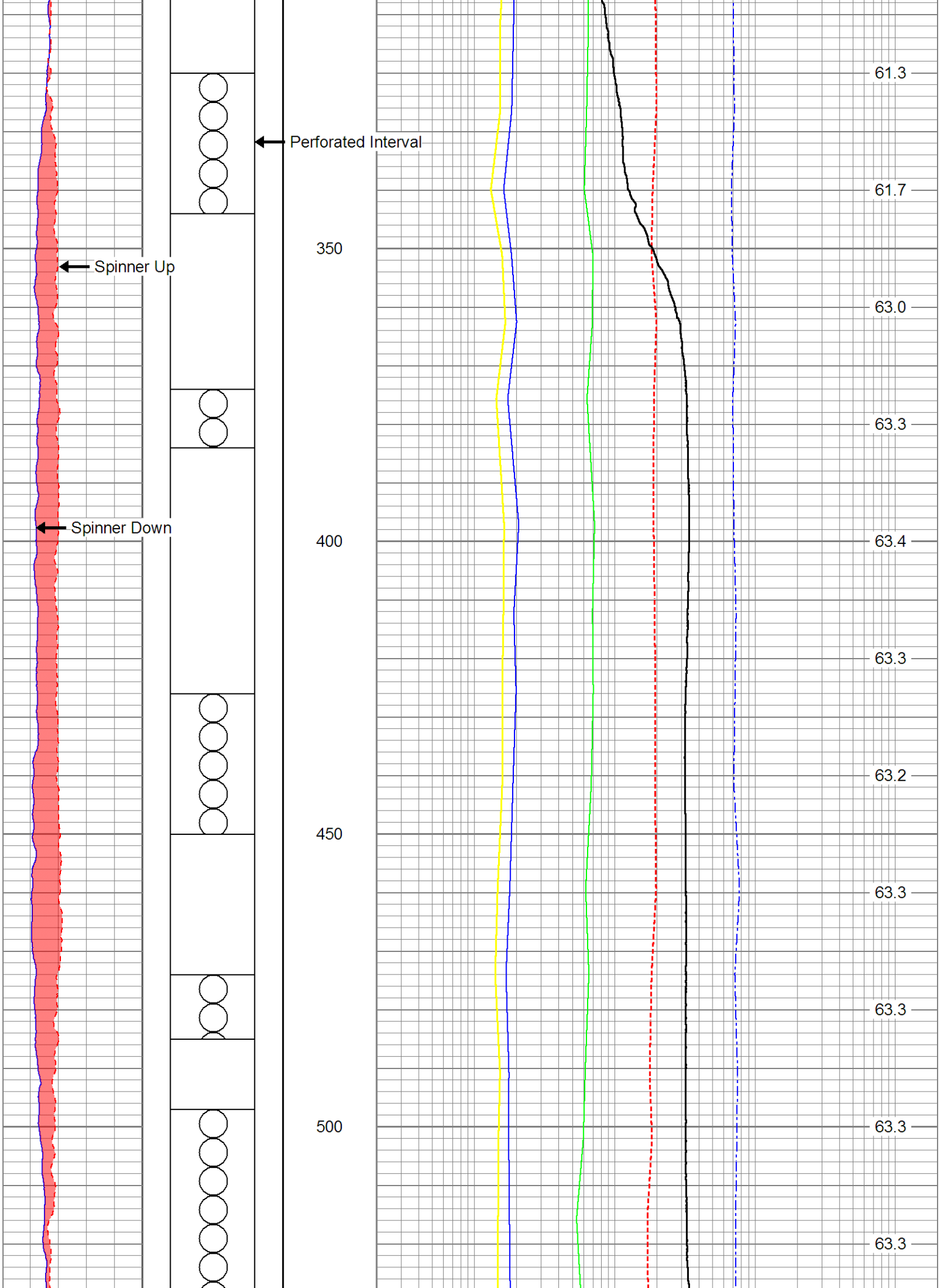
All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.

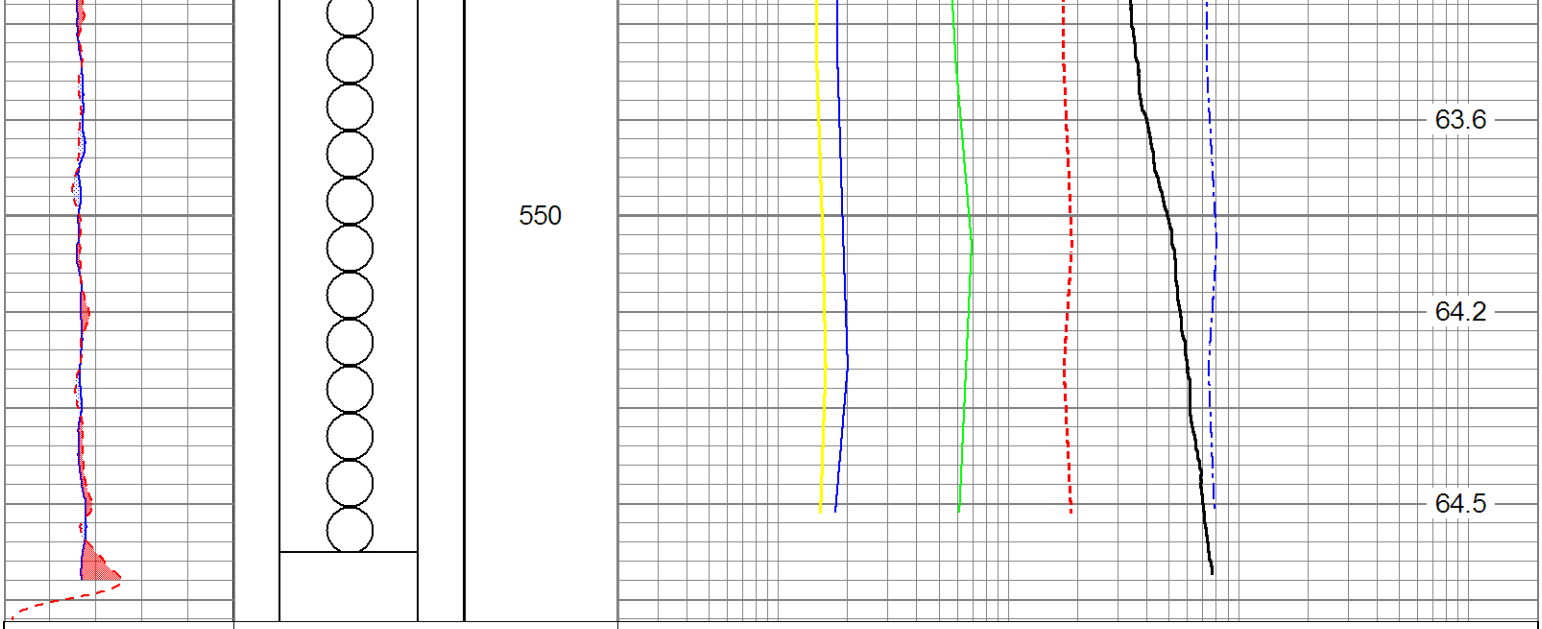
Comments

The casing schedule in the well sketch is based on the original well designed. The liner has SST wire-wrap screen from 325 to 595'

Database File: 15802b.db
Dataset Pathname: _dlog3_
Presentation Format: noise
Dataset Creation: Wed Mar 16 14:30:50 2011
Charted by: Depth in Feet scaled 1:240


Spin Down
0 (cps) 25
Spin Up Run
-1 (cps) 24
2 1000HZ (mV) 20000
2 600HZ (mV) 20000
2 200HZ (mV) 20000
55 Temperature (degF) 70
2 4000HZ (mV) 20000
2 6000HZ (mV) 20000
temp (degF)
150
200
250
300
Temperature
Hole in CSG
Swaged Patch
Inflow from Hole
59.6
57.7
57.3
57.5
57.8
58.4
59.3
60.3
60.8


Perforated Interval
Spinner Up
Spinner Down
350
400
450
500
61.3
61.7
63.0
63.3
63.4
63.3
63.2
63.3
63.3
63.3
63.3



Spin Down		
0 (cps) 25		
Spin Up Run		
-1 (cps) 24		

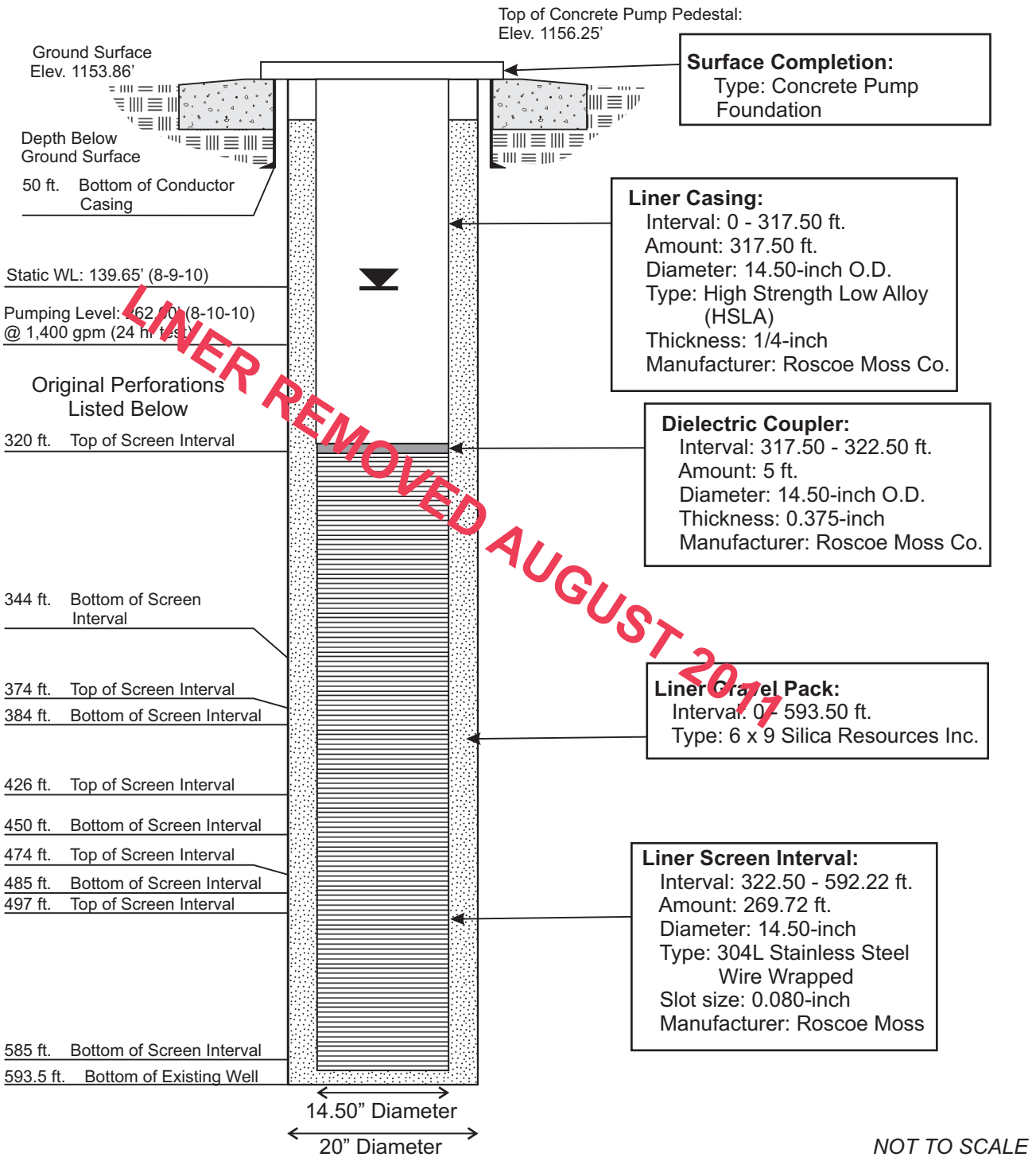
2	1000HZ (mV)	20000
2	600HZ (mV)	20000
2	200HZ (mV)	20000
55	Temperature (degF)	70
2	4000HZ (mV)	20000
2	6000HZ (mV)	20000

temp (degF)

Battelle

Well Liner Diagram
Pasadena, California
WINDSOR-48

State Well ID#: 1910124-022	Site: City of Pasadena (MHTS)	Well #: WINDSOR-48	Northing: 1892155.945
Rehabilitation Contractor: Layne Christensen	Well/Liner Diameter: 20.00-inch/14.50-inch	Liner Install Date: 4/12/10 - 4/16/10	Easting: 6511051.010
Reviewed by: C. Shem Hawes	Installer/Welder: M. Evans/G. Frias	Geologist: D. Conner	Surface Elevation: 1153.86'



Pump Performance Datasheet

Customer	: LAYNE CHRISTENSEN/FONTANA	Quote number	: 134703
Customer reference	: Battelle - Windsor Well 250 hp pump	Item description	: 12CHC
Item number	: 001	Stages	: 9
Service	: Potable Water	Based on curve number	: 12CHC-1770
Quantity	: 1	Date last saved	: 01 Sep 2010 4:33 PM

Operating Conditions

Flow, rated	: 1,400.0 USgpm
Differential head / pressure, rated (requested)	: 550.0 ft
Differential head / pressure, rated (actual)	: 556.5 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Performance

Speed, rated	: 1,770 rpm
Impeller diameter, rated	: 8.63 in
Impeller diameter, maximum	: 8.69 in
Impeller diameter, minimum	: 7.94 in
Efficiency (bowl / pump)	: 82.80 / 78.68 %
NPSH required / margin required	: 20.03 / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 44 / 157 Metric units
MCSF	: 800.0 USgpm
Head, maximum, rated diameter	: 805.1 ft
Head rise to shutoff	: 46.38 %
Flow, best eff. point (BEP)	: 1,095.1 USgpm
Flow ratio (rated / BEP)	: 127.85 %
Diameter ratio (rated / max)	: 99.25 %
Head ratio (rated dia / max dia)	: 97.09 %
Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 0.998 / 0.998 SG
Viscosity, rated	: 1.00 cP
-	:

Material

Material requested	: Auto
Material selected	: CI Bowl (Lined) / Std. Brz Impeller

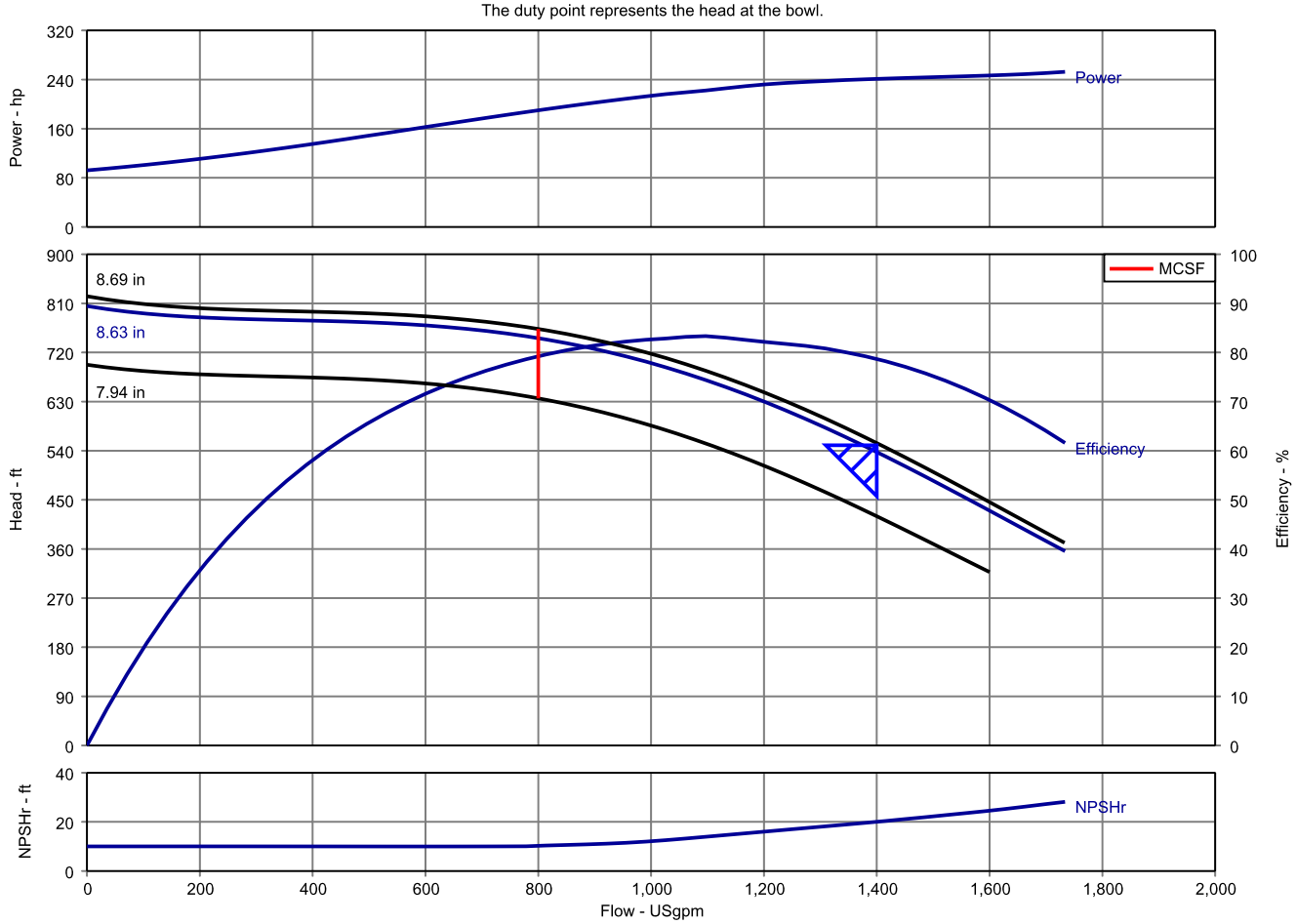
Pressure Data

Maximum working pressure	: 348.4 psi.g
Maximum allowable working pressure	: 390.0 psi.g
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data

Driver sizing specification	: Rated power
Margin over specification	: 0.00 %
Service factor	: 1.15 (used)
Power, hydraulic	: 194 hp
Power (bowl / pump)	: 234 / 241 hp
Power, maximum, rated diameter	: 253 hp
Minimum recommended motor rating	: 250 hp / 186 kW

Pump performance. Adjusted for construction, viscosity, static lift to discharge nozzle centerline, friction and power losses of lineshaft and thrust bearings.
The duty point represents the head at the bowl.



Layne Christensen/ Fontana · 11001 Etiwanda Ave · Fontana, CA 92337
phone: 909-390-2833 · fax: 909-390-6097

Pump Performance - Additional Data

Customer	: LAYNE CHRISTENSEN/FONTANA	Quote number	: 134703
Customer reference	:	Item description	: 12CHC
Item number	: 001	Stages	: 9
Service	:	Speed, rated	: 1,770 rpm
Quantity	: 1	Intellicode	:
		Date last saved	: 01 Sep 2010 4:33 PM

Performance Data	
Head, maximum diameter, rated flow	: 566.4 ft
Head, minimum diameter, rated flow	: 432.3 ft
Head, maximum, rated diameter	: 805.1 ft
Efficiency adjustment factor, total	: 1.00
Power adjustment, total	: 0.00 hp
Head adjustment factor, total	: 1.00
Flow adjustment factor, total	: 1.00
NPSH required adjustment factor, total	: 1.00
NPSH margin dictated by pump supplier	: 0.00 ft
NPSH margin dictated by user	: 0.00 ft
NPSH margin used (added to 'required' values)	: 0.00 ft

Mechanical Limits	
Torque, rated power	: 13.62 hp/100 rpm
Torque, maximum power	: 14.27 hp/100 rpm
Torque, driver power	: 14.04 hp/100 rpm
Torque, pump shaft limit	: 29.62 hp/100 rpm
Radial load, rated	: -
Radial load limit	: -
Impeller peripheral speed, rated	: -
Impeller peripheral speed limit	: -

Stage, Speed and Solids Limits	
Stages, maximum	: 15
Stages, minimum	: 1
Pump speed limit, maximum	: 2,200 rpm
Pump speed limit, minimum	: 400 rpm
Curve speed limit, maximum	: 2,200 rpm
Curve speed limit, minimum	: 400 rpm
Variable speed limit, minimum	: -
Solids diameter limit	: 0.50 in

Recommended Driver Data (Not applicable to actual driver)	
Driver speed, full load	: 1,780 rpm
Driver speed, rated load	: 1,781 rpm
Driver efficiency, 100% load	: N/A
Driver efficiency, 75% load	: N/A
Driver efficiency, 50% load	: N/A

Various Performance Data	Flow (USgpm)	Head (ft)	Efficiency (%)	NPSHr (ft)	Power (hp)
Shutoff, rated diameter	0.00	805.1	-	-	85.42
Shutoff, maximum diameter	0.00	823.1	-	-	83.85
MCSF	800.0	750.3	82.59	10.21	183
Rated flow, minimum diameter	1,400.0	432.3	79.91	-	191
Rated flow, maximum diameter	1,400.0	566.4	82.90	-	241
BEP flow, rated diameter	1,095.1	677.7	86.90	13.89	215
120% rated flow, rated diameter	1,680.0	403.4	70.33	26.68	243
Maximum flow, rated diameter	1,733.8	374.9	66.64	28.14	246
Maximum flow, minimum diameter	1,600.0	333.8	67.02	24.50	201
Maximum flow, maximum diameter	1,733.0	390.2	68.00	28.16	251
Maximum value, rated diameter	-	805.1	86.90	-	253
Maximum value, maximum diameter	-	-	87.00	-	251

Differential pressure	@ Density, rated	@ Density, max
Differential pressure, rated flow, rated diameter (psi)	238.0	238.0
Differential pressure, shutoff, rated diameter (psi)	348.4	348.4
Differential pressure, shutoff, maximum diameter (psi)	356.2	356.2

Discharge pressure	@ Suction pressure, rated	@ Suction pressure, max	@ Suction pressure, rated	@ Suction pressure, max
Discharge pressure, rated flow, rated diameter (psi.g)	238.0	238.0	238.0	238.0
Discharge pressure, shutoff, rated diameter (psi.g)	348.4	348.4	348.4	348.4
Discharge pressure, shutoff, maximum diameter (psi.g)	356.2	356.2	356.2	356.2

Ratios			
Maximum flow / rated flow, rated diameter	:123.84 %	Head rated diameter / head minimum diameter, rated flow	:127.20 %

Mixed Stage Performance	Set #1	Set #2	Set #3	Set #4	Alternate First Stage
Item description	12CHC	-	-	-	-
Stages	9	-	-	-	-
Based on curve number	12CHC-1770	-	-	-	-
Impeller diameter, rated	8.63	-	-	-	-

Pump Performance - Additional Data

Customer	: LAYNE CHRISTENSEN/FONTANA	Quote number	: 134703
Customer reference	:	Item description	: 12CHC
Item number	: 001	Stages	: 9
Service	:	Speed, rated	: 1,770 rpm
Quantity	: 1	Intellicode	:
		Date last saved	: 01 Sep 2010 4:33 PM

Head and Power Losses

Friction loss rate, column	: 1.30 %
Friction loss, column	: 5.19 ft
Friction loss, discharge head	: 0.59 ft
Friction loss, can/barrel	: -
Friction loss, bowl/column adaptor	: 6.56 ft
Friction loss, total	: 12.34 ft
Power loss, lineshaft bearings	: 5.75 hp
Power loss, thrust bearing	: 0.98 hp
Power loss, total	: 6.73 hp

Bowl vs. Pump Performance

Head (bowl / pump)	: 549.9 ft / 537.5 ft
Efficiency (bowl / pump)	: 82.80 % / 78.68 %
Power (bowl / pump)	: 234 hp / 241 hp
NPSH required at first stage impeller eye	: 20.03 ft

Weights and Down Thrust

Weight, lineshaft	: 3,060.5 lb
Weight, bowl assembly rotating element	: 207.0 lb
Thrust factor	: 7.50 lb/ft
Thrust, hydraulic (rated / max)	: 4,117.5 / 6,028.1 lbf
Thrust, bowl shaft end (rated / max)	: -0.00 / -0.00 lbf
Thrust, shaft step (rated / max)	: -0.09 / -0.09 lbf
Thrust, headshaft sleeve (rated / max)	: 0.00 / 0.00 lbf
Thrust, total (rated / max)	: 7,384.9 / 9,295.5 lbf

Pressure and Torque Limits

Maximum column pressure	: 348.4 psi.g
Column pressure limit	: 836.0 psi.g
Maximum discharge head pressure	: 348.4 psi.g
Discharge head pressure limit	: 400.0 psi.g
Maximum can / barrel pressure	: -
Can / barrel pressure limit	: -
Torque, lineshaft limit	: 18.02 hp/100 rpm

Dimensions

Minimum clearance below suction bell lip/case	: 32.75 in
Minimum well diameter	: 14.00 in
Suction nozzle centerline height	: -
Bowl assembly length, first stage (does not include motor adapter)	: 21.38 in
Bowl assembly length, upper stage	: 11.00 in
Bowl assembly length, total	: 109 in
Suction bearing hub length	: 0.88 in
Strainer length	: 19.00 in
Bowl to column adaptor length	: 4.12 in
Discharge head stick-down	: 0.00 in
Submersible motor adaptor length	: -
Submersible motor length	: -
Column length	: 400.0 ft
Total pump length (does not include motor adapter or motor length)	: 411.0 ft
Can / barrel length	: -
Headshaft sleeve diameter (if used)	: 1.69 in
Suction bell diameter	: 11.50 in
Minimum submergence to prevent vortexing	: 26.00 in
Discharge head height	: 28.25 in
Discharge nozzle centerline height	: 0.56 in
Lineshaft length	: 402.7 ft
Bowl shaft diameter	: 1.69 in
Bowl diameter, outside	: 12.10 in
Bowl diameter, exit	: 5.10 in
Column diameter, inside	: 10.02 in
Column internal obstruction diameter	: 1.69 in
Can/barrel diameter, inside	: -

NPSH

NPSH at bowl (available / required)	: Ample / 20.03 ft
NPSH at low liquid level (available / required)	: Ample / -388.68 ft
NPSH at suction flange (available / required)	: - / -

Liquid Velocities

Column liquid velocity	: 5.86 ft/s
Can liquid velocity	: -
Suction nozzle liquid velocity	: -

Additional Conditions

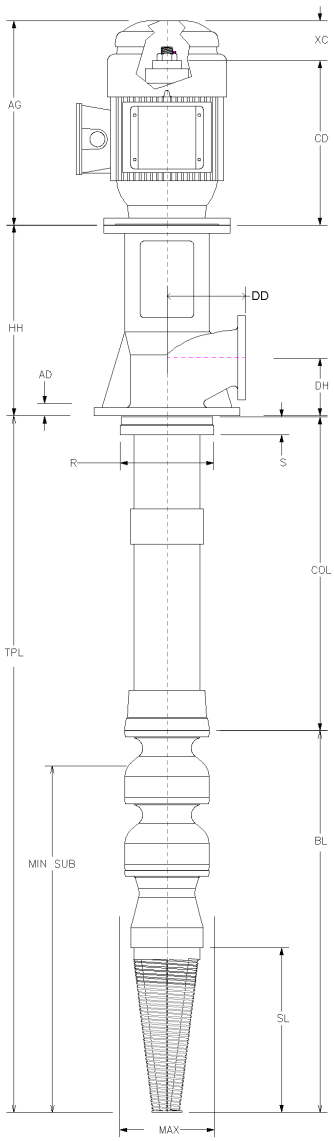
Pump type	: Deep well turbine	Low liquid level	: 0.00 ft
Head measured at	: Bowl	NPSHa measured at	: Bowl
Length strategy	: Column length	Column friction rate limit	: 5.00 %
Length	: 400.0 ft	Well diameter	: 14.00 in

Construction

Suction type	: Suction bowl (threaded suction case)	Discharge head design	: Cast iron (high profile)
Suction strainer	: Threaded cone strainer	Discharge head size	: 10 inch
Lineshaft diameter	: 1 11/16 inch	Column diameter	: 10 inch
Lineshaft lubrication	: Open lineshaft, product lube	Column construction	: Threaded
Lineshaft material	: 416SS	Headshaft sleeve	: Not included

Dimensional Outline

Customer	: LAYNE CHRISTENSEN/FONTANA	Quote number	: 134703
Customer reference	:	Item description	: 12CHC
Item number	: 001	Stages	: 9
Service	: -	Speed	: 1,770 rpm
Quantity of pumps	: 1	Date last saved	: 01 Sep 2010 4:33 PM

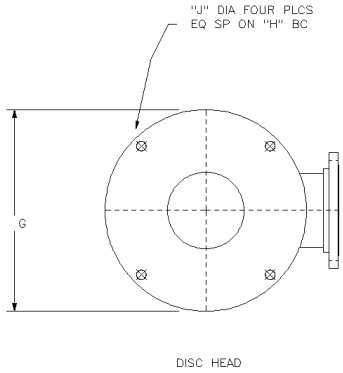


Pump Data

AD	: 1.37 in	Bowl Shaft	: 1.69 in
AG	: 50.06 in		
BD	: 16.50 in	Line Shaft	: 1.69 in
BL	: 114 in	Line Shaft Type	: Open
CD	: 44.78 in	Column Type	: Standard
CL	:	Column	: 10 in. Threaded
COL	: 401.6 ft	Bearing Spacing	: 10.00 ft
	:	Section Length	: 10.00 ft
DD	: 14.69 in	Head Type	: F Cast
MIN SUB	: 41.00 in	Head Size	: 10 X 16 1/2 CF
MS	:	Flange Rating	: 250#
DH	: 10.56 in		
G	: 25.00 in	Seal	: Packing
H	: 22.75 in	Strainer	: Cone
HH	: 28.25 in	SubBase	: No
J	: 0.75 in		
R	: 14.60 in		
S	: 2.38 in		
SL	: 19.00 in		
TPL	: 411.0 ft		
UG	:		
V	:		
W	:		
X	:		
XC	: 0.00 in		
Y	:		
Z	:		
	:		
Max Allowable Shaft Elongation	:		
Total Shaft Elongation	: 0.31 in		
MAX	: 11.75 in		

Hydraulic Data

Flow	: 1,400.0 USgpm
TDH (total dynamic head)	: 537.5 ft
	:
Speed	: 1,770 rpm
Fluid	: Fresh Water
Temperature	: 68.00 deg F
Viscosity	: 1.00 cP
Density	: 0.998 SG
SU	: 0.00 in
	:
	:
M (TPI)	: 0
L	: 1.69 in



Miscellanious

Thrust at Design	: 7,384.9 lbf
Max Thrust	: 9,295.5 lbf
	:

Weight

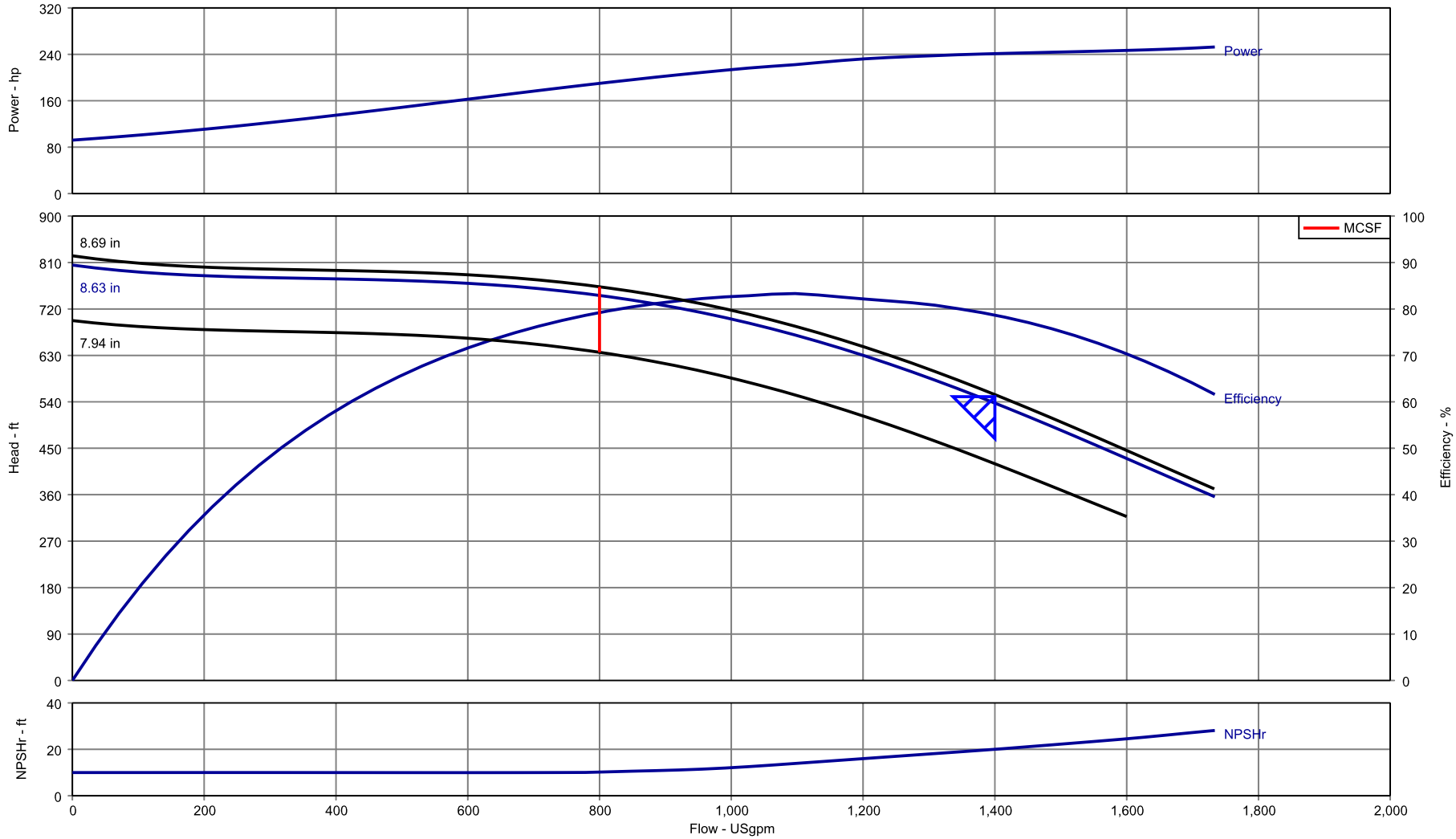
Pump	: 19,595.2 lb
Motor	: 1,600.0 lb
Total	: 21,195.2 lb

Motor Data

Model	: HO250V2SLH
Make	: -
HP	: 250
"Nominal" RPM	: 1800
ITT Item No.	: N/A
"Nominal" Efficiency	: 95.8
Frame	: H445TPA
Ratchet	: NRR

Pump Performance Curve

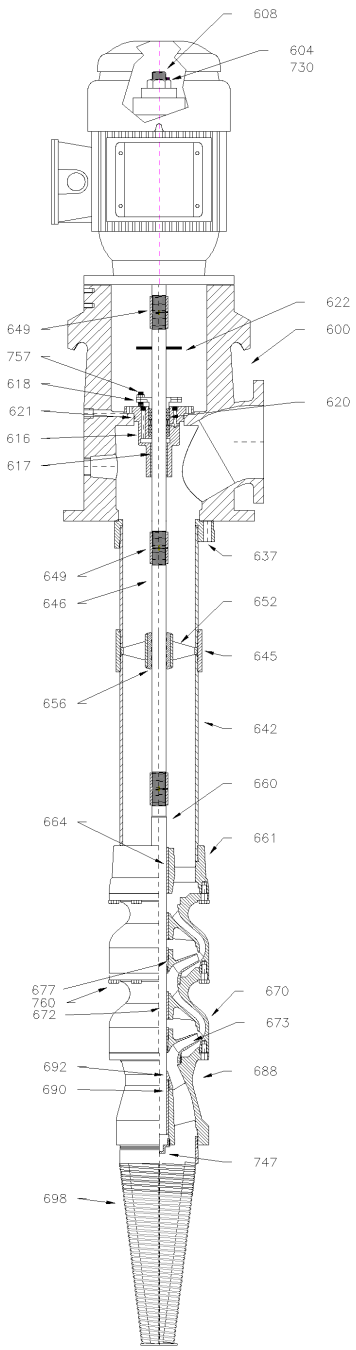
Pump performance. Adjusted for construction, viscosity, static lift to discharge nozzle centerline, friction and power losses of lineshaft and thrust bearings.
The duty point represents the head at the bowl.



Customer	: LAYNE CHRISTENSEN/FONTANA	Item description	: 12CHC	Flow, rated	: 1,400.0 USgpm
Customer reference	:	Stages	: 9	Differential head / pressure, rated	: 550.0 ft
Item number	: 001	Speed, rated	: 1,770 rpm	Fluid density, rated / max	: 0.998 / 0.998 SG
Service	:	Based on curve number	: 12CHC-1770	Viscosity	: 1.00 cP
Quantity	: 1	Efficiency (bowl / pump)	: 82.80 / 78.68 %	Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00
Quote number	: 134703	Power (bowl / pump)	: 234 / 241 hp	-	
Date last saved	: 01 Sep 2010 4:33 PM	NPSH required	: 20.03 ft	-	

Sectional Drawing

Customer	: LAYNE CHRISTENSEN/FONTANA	Quote number	: 134703
Customer reference	:	Item description	: 12CHC
Item number	: 001	Stages	: 9
Service	: -	Speed	: 1,770 rpm
Quantity of pumps	: 1	Date last saved	: 01 Sep 2010 4:33 PM



Discharge Head Assembly

ITEM	NAME	CODE	MATERIAL	ASTM
600	Head- Discharge	1003	Cast Iron CL30	A48-94ae1
604	Adjusting Nut	2130	Brass C36000	B16M-00
608	Headshaft	2227	SST 416	A582M-95b
616	Housing	1003	Cast Iron CL30	A48-94ae1
617	Housing bearing	1109	Federalloy Bismuth Bronze	B584-00
618	Split Gland	1203	SST 316	A744M-00
620	Packing	5026	Graphite Packing	ML402-99
621	O-Ring	5302	Nitrile Buna N	D4322-96
637	Top Column Flange	1003	Cast Iron CL30	A48-94ae1
639	Column Lock Ring	1018	Cast Iron CL30	A48-94ae1
649	Lineshaft Coupling	2265	416 SS	A582M-95b
757	Screw- Gland Adjusting	2229	SST 316	A276-00a
779	Gasket- Housing	5136	Acrylic/Nitrile	5136 REV 4

Column And Lineshaft Assembly

ITEM	NAME	CODE	MATERIAL	ASTM
642	Column Pipe	6501	Black Pipe	A 53-98
645	COLUMN FASTENER	6501	~~Black Pipe SCH 40~~ ductile	~~A 53-98~~
646	Lineshaft	2227	416 SS	A582M-95b
649	Lineshaft Coupling	2265	416 SS	A582M-95b
652	Retainer- Bearing	1102	~~Silicon Bronze C87600~~ ductile	~~B584-00~~
656	Lineshaft Bearing	5121	Rubber EPDM	D3568-98

Bowl Assembly

ITEM	NAME	CODE	MATERIAL	ASTM
660	Bowl Shaft	2227	416 SS	A582M-95b
661	Bowl- Discharge	1003	Cast Iron CL30	A48-94ae1
664	Bearing- Disc Bowl	1109	Federalloy Bismuth Bronze	B584-00
670	Bowl - Intermediate	6911	Cast Iron 30 Lined	A48-94e1
672	Bearing- Int. Bowl	1109	Federalloy Bismuth Bronze	B584-00
673	IMPELLER	1102	Silicon Bronze	B584-00
677	Collet	2227	SST 416	A582M-95b
688	Bowl/Bell- Suction	1003	Cast Iron CL30	A48-94ae1
690	Bearing- Suction	1109	Federalloy Bismuth Bronze	B584-00
692	Sandcollar	1205	304 SST	A744M-00
698	Strainer- Suction	6952	Carbon Steel Galv.	A123M-00
747	Suction Plug	1046	Malleable Iron	A197
760	CAP SCREW	2229	316 ss	A194

General Information

Typical Motor Construction Features

FRAME MATERIAL:

NEMA®† FRAMES (180 thru 447)

Type:	AV, AU, AUE, AUI	Aluminum
	RV, RU, RUE, RUEI, RUSI	Cast Iron
	TV, TU	Aluminum (180-280 Frames)
		Cast Iron (320-440 Frames)

TITAN® FRAMES (5008)

Type:	RU, RUEI	Cast Iron

BRACKETS:

NEMA®† FRAMES

Both end brackets are cast iron except for the following:
Type AV: Upper bracket on 180 & 210 frames is aluminum.
Type TV: Upper bracket on 180-280 frames is aluminum.
Type TU: Upper bracket on 250 & 280 frames is aluminum.

TITAN® FRAMES (5008)

Cast iron.

CANOPY CAP: Constructed of plastic, steel, aluminum, fiberglass or cast iron depending on exact frame and type.

FAN COVER (TEFC): Constructed of plastic, steel, aluminum or cast iron depending on exact frame and type.

BEARING CAPS: All Vertical motors are furnished with lower bearing caps constructed of aluminum or cast iron.

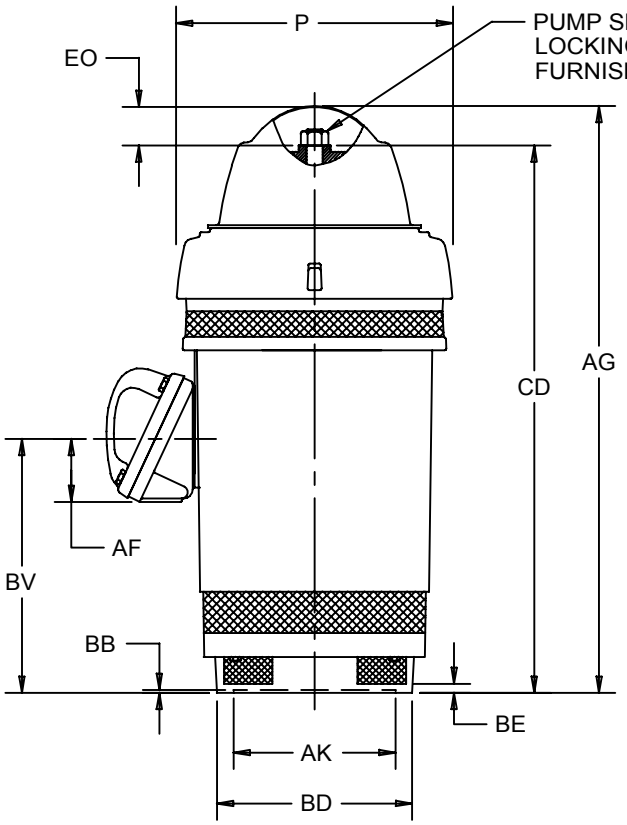
STANDARD ROTATION: Counter Clockwise (CCW) viewed from top of the motor.

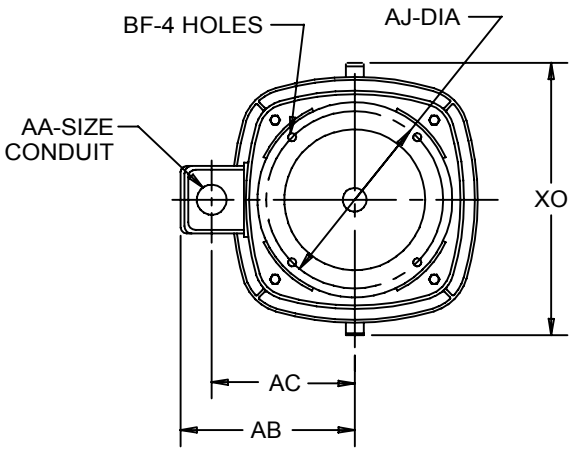
BEARING LUBRICATION

Frame	Type	Upper Bearing	Lower Bearing	Thrust Capacity
180-280	AUC, AUE, AU, AUI, AUR	Grease	Grease**	High
180-440	AV, TV	Grease	Grease**	Normal
320-447	RV	Grease	Grease**	Normal
	RU, RUE, RUSI	Oil	Grease	High
180-360	TU	Grease	Grease**	High
400-440		Oil	Grease	High
5000	RU, RUS, RUEI	Oil	Grease	High

**Lower bearing is thrust bearing. † All non-Emerson Electric Co. marks shown within this document are properties of their other respective owners.

EFFECTIVE: 15-APR-04	VERTICAL MOTORS WEATHER PROTECTED TYPE I FRAME: H444, H445TP, TPA TYPE: RU, RUE, RUI, RUS	PRINT: 09-2228
SUPERSEDES: 24-JUL-01		SHEET: 1 OF 1





ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

	UNITS	P [2]	AG	AJ	AK +.005	BB MIN	BE	BF	BV	CD	EO	XO
	IN	23.38	50.06	14.750	13.500	.25	.75	.69	21.19	44.78	5.13	27.50
	MM	594	1272	374.65	342.90	6	19	18	538	1137	130	699

	CONDUIT BOX MATERIAL	UNITS	AA	AB	AC	AF
	STEEL	IN	3.00	18.94	14.44	4.72
		MM		481	367	120
	CAST IRON	IN	3-1/2 NPT	18.56	14.31	5.28
		MM		471	363	134

Windsor 250 hp motor

	FRAME	UNITS	BD MAX
	H444, H445TP	IN	16.50
		MM	419
	H444, H445TPA	IN	20.00
		MM	508

TOLERANCES	
FACE RUNOUT	.007 F.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.007 F.I.R.

1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2: LARGEST MOTOR WIDTH.
3: CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
4: TOLERANCES SHOWN ARE IN INCHES ONLY.

EMERSON. Motor Technologies

US MOTORS

OPERATING CHARACTERISTICS – VERTICAL HOLLOSHAFT® MOTORS
HIGH THRUST - "P" BASE, THREE PHASE, WEATHER PROTECTED TYPE I (WPI)
PREMIUM EFFICIENT AND PREMIUM EFFICIENT/INVERTER DUTY

PERF DATA
VHS
WPI
PRE EFF

HP	RPM		% EFFICIENCY			% POWER FACTOR			CURRENT (AMPS) 460 VOLTS		TORQUE AT FULL VOLTAGE (FT./LBS.)			NEMA CODE
											FULL LOAD TORQUE @	LOCKED (STARTING)	PULLOUT BREAKDOWN	
	NO LOAD	FULL LOAD	FULL LOAD	3/4 LOAD	1/2 LOAD	FULL LOAD	3/4 LOAD	1/2 LOAD	FULL LOAD	LOCKED STARTING	FULL LOAD SPEED	% OF FULL LOAD		
15	1800	1770	91.7	92.4	92	83.4	80.5	72.6	18.4	108	44.5	227	240	G
20	1800	1770	92.4	93.3	93.3	85.4	84	78.6	23.7	136	59.4	222	223	G
25	1800	1765	92.4	93.5	93.5	84.6	82.7	76.5	30	173	74.3	230	230	G
30	1800	1770	92.4	93.8	93.9	84.5	82.8	76.8	36	201	89.1	224	222	G
40	1800	1780	94.1	94.4	93.6	87.8	86.4	81.3	45	286	117.9	192	251	G
50	1800	1780	94.5	94.6	94.1	87.7	86.2	80.9	56	358	147.5	192	252	G
60	1800	1785	94.5	95.2	94.8	87.2	85.9	80.9	68	434	176.7	200	237	G
75	1800	1780	95	95.3	95.1	85.3	82.9	75.8	87	539	221.1	200	247	G
100	1800	1785	95.4	95.5	95.1	86.3	84.5	78.4	114	737.5	294.3	185	230	G
125	1800	1785	95.4	95.6	95.3	86.4	85.2	79.7	142	924.1	368.1	186	230	G
150	1800	1785	95.8	96.1	95.6	86.3	83.9	77.1	169	1072.2	441.5	174	235	G
200	1800	1785	95.8	96.2	95.8	85.4	82.4	74.6	228	1484.2	588.9	186	244	G
250	1800	1780	95.8	96	95.6	83.9	80.4	71.8	292	1794.3	737.1	183	235	G
300	1800	1785	95.8	96.2	96	88.6	88.1	84.4	331	2200	883.1	80	175	G
350	1800	1785	95.8	96.5	96.5	87.9	87.2	83.2	389	2550	1031.2	80	175	G
400	1800	1780	95.8	96.3	96.2	86.5	85	79.5	452	2900	1179	80	175	G
450	1800	1785	96.2	96.6	96.3	89.1	88.5	85	491	3250	1323.3	80	175	G

Efficiency and power factor values listed above are typical values. For guaranteed and certified values, refer to the Technical Service Group.
The code letter is an indication of the locked rotor K.V.A. in accordance with the National Electrical Code.
When performance values have been quoted, they should be shown on the order.
Data subject to change without notice.

APPENDIX 2-7: Original Well 52 Completion and Boring Log

ROSCOE MOSS COMPANY

Form RM 114

4360 WORTH STREET
LOS ANGELES, CAL.

Well No. 52 Job No. 476
Owner Water & Power Dept. City of Pasadena
Address 100 North Garfield,
Pasadena, California 91109
Location T ____ R ____ Sec. ____
¼ ¼ ¼
Windsor Avenue

Started Work 9-30-1977
Completed Work 11-24-1977
Total Depth Drilled 647 '
Depth Water First Encountered 170'

MATERIALS

Conductor Casing

Material mild steel
Diameter (OD) (ID) 24 in. Wall Thickness ½ in.
Installed From 0' ft. To 50' ft.
Cemented From 12' ft. To 50' ft.
Size Shoe 24"x8"x1"

Well Casing

DIAMETER (OD)(ID)	WALL OR GAUGE	MATERIAL	FROM	TO
20	8x8	Kai-well	0'	640'
			total- 644'	
4' left in job to be used for stickup				

Starter Used 23' ft. of 3 ply 8 wall or gauge
Size Shoe 20"X14"X 1 ¼"

PERFORATIONS

Type of Perforator Used Hydraulic - Louver Cut

FROM	TO	WIDTH	LENGTH	HOLES PER FOOT	SQ. INCH PER FOOT
250	360	3/16	2-1/2	20	
360	367	3/16	2-1/2	10	
372	556	3/16	2-1/2	10	
556	630	3/16	2-1/2	20	

Development & Test Record

Was Well Swabbed? Yes

Formation: Mention size of water gravel —

0	ft. to	15	ft.	Sandy clay, gravel &boulde
	" "		"	to 24".
15	" "	30	"	Sand, gravel, & boulders.
30	" "	35	"	Sand, clay, & boulders.
35	" "	50	"	Gravel & boulders.
50	" "	75	"	Sand, clay, & gravel.
75	" "	85	"	Sand,clay,gravel,&boulders
85	" "	110	"	Gravel, & boulders.
110	" "	130	"	Sand,gravel,some boulder
	" "		"	clay - hard.
130	" "	215	"	Sand, clay, & gravel.
215	" "	252	"	Sand,gravel,claystreak-har
252	" "	268	"	Sand,gravel to 4"some clay
268	" "	272	"	Clay and gravel to 2"
272	" "	284	"	Sand, gravel to 4", some
	" "		"	boulders to 10".
284	" "	292	"	Sand, gravel,hard a little
	" "		"	clay.
292	" "	296	"	Sand and gravel - tight.
296	" "	300	"	Sand & gravel to 6" loose.
300	" "	312	"	Sand, gravel, little clay
	" "		"	hard.
312	" "	320	"	Sand, gravel, some boulder
320	" "	324	"	Sand, gravel, tight.
324	" "	336	"	Fine sand & gravel.
336	" "	344	"	Sand, gravel & clay- hard.
344	" "	348	"	Sand, gravel some clay.
348	" "	352	"	Sand, gravel & clay - hard
352	" "	356	"	Clay & small gravel to 3/16
	" "		"	hard.
356	" "	360	"	Clay & gravel to 1".
360	" "	368	"	Hard clay.
368	" "	372	"	Sand.
372	" "	424	"	Hard clay.
424	" "	444	"	Hard clay, some sandy clay
	" "		"	streaks.
444	" "	448	"	Sandy clay & small gravel
	" "		"	to ½".

If Well Is Reduced, Indicate:
Amount of Lap at Reduction ____ ft.
Amount of Lap at Reduction ____ ft.
Amount of lap at Reduction ____ ft.
Method of Sealing at Reduction ____

Give any additional data which may be of future value
Cemented conductor pipe from 12' to 50' on outside, using 6yds of cement. Water level was up at 155' to depth of 360'

MATERIALS

Conductor Casing

Material mild steel

Diameter (OD) (ID) 24 in. Wall Thickness ¼ in.

Installed From 0' ft. To 50' ft.

Cemented From 12' ft. To 50' ft.

Size Shoe 24"x8"x1"

Well Casing

DIAMETER (OD)(ID)	WALL OR GAUGE	MATERIAL	FROM	TO
20	8x8	Kai-well	0'	640'
			total-	644'
4' left in job to be used for stickup				

Starter Used 23' ft. of 3 ply 8 wall or gauge

Size Shoe 20"X14"X 1 ¼"

PERFORATIONS

Type of Perforator Used Hydraulic - Louver Cut

FROM	TO	WIDTH	LENGTH	HOLES PER FOOT	SQ. INCH PER FOOT
250	360	3/16	2-1/2	20	
360	367	3/16	2-1/2	10	
372	556	3/16	2-1/2	10	
556	630	3/16	2-1/2	20	

Development & Test Record

Was Well Swabbed? Yes

Method Wire Line

No. of Hours 20

Total Material Removed

Water level when Test first started 157 ft.

Draw down from standing level 16 ft.

No. of gallons per minute pumped when Test first started 795

No. of gallons per minute pumped when Test completed 1040

Draw down at completion of Test 34 ft.

Hours Testing Well 141

272	" "	284	" Sand, gravel to 4", some
	" "		" boulders to 10".
284	" "	292	" Sand, gravel, hard a little
	" "		" clay.
292	" "	296	" Sand and gravel - tight.
296	" "	300	" Sand & gravel to 6" loose.
300	" "	312	" Sand, gravel, little clay
	" "		" hard.
312	" "	320	" Sand, gravel, some boulder
320	" "	324	" Sand, gravel, tight.
324	" "	336	" Fine sand & gravel.
336	" "	344	" Sand, gravel & clay- hard.
344	" "	348	" Sand, gravel some clay.
348	" "	352	" Sand, gravel & clay - hard
352	" "	356	" Clay & small gravel to 3/16
	" "		" hard.
356	" "	360	" Clay & gravel to 1".
360	" "	368	" Hard clay.
368	" "	372	" Sand.
372	" "	424	" Hard clay.
424	" "	444	" Hard clay, some sandy clay
	" "		" streaks.
444	" "	448	" Sandy clay & small gravel
	" "		" to ¼".

If Well Is Reduced, Indicate:

Amount of Lap at Reduction ft.

Amount of Lap at Reduction ft.

Amount of lap at Reduction ft.

Method of Sealing at Reduction

Give any additional data which may be of future value

Cemented conductor pipe from 12' to 50' on outside, using 6yds of cement. Water level was up at 155' to depth of 360' started dropping down, at time of completio of well water was at 255'.

Driller Joe A. Garcia

Date of Report 11-27-77

Type and Rig No. Used Cable tool rig # 44

612	647	Cement, sand, & gravel some clay streaks - hard.

CITY OF PASADENA
Pasadena, California

Well No. 52

Driller - Joe Garcia

Date- 11-24-77

Cable Tol

APPENDIX 2-8: Summary Video Log Inspection Sheets for Well 52

Pacific Surveys

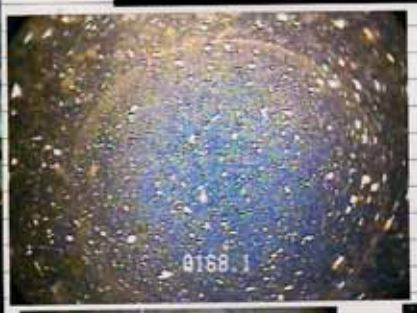
a full service geophysical well logging company

Video Survey Report

Company:	Battelle	**Date:**	16-Sep-03
Well:	City of Pasadena #52	**Run No.**	One
Field:	JPL	**Job Ticket:**	10997
State:	California	**Total Depth:**	621 ft
		Water Level:	83 ft
Location:	Upper Arroyo Canyon		
Zero Datum:	Top of Casing	**Tool Zero:**	Side-Scan
Reason for Survey:	General Inspection		

Depth	Remarks
0.0 ft	Start of Survey ; T.O.C.
83.4 ft	Static water level; cloudy, moderate particles
	light scale
120.0 ft	Scale increasing
167.0 ft	Nodules increasing in size
169.6 ft	Possible patch
180.0 ft	Clearing, light particles
248.2 ft	Top of perfs; hydraulic horizontal louvers; mostly open
	clearing
338.0 ft	Jetting perf visible flow
360.0 ft	Clearing
369.0 ft	Bottom of perfs
374.0 ft	Top of perfs; mostly plugged
410.0 ft	Perfs mostly plugged, heavier nodules
460.0 ft	Encrustation heavy
500.0 ft	Getting darker casing; heavy nodules
503.0 ft	Top of airline
540.0 ft	Airline in center well
580.0 ft	Black deposits on casing
614.0 ft	2nd airline segment
617.3 ft	3rd airline segment
620.5 ft	Bottom; fill

Perforation:	
Horizontal	248.20 ft to 369.00ft
Louvers	374.00 ft to 620.50ft
Casing Size	
20" M/Steel	0.00 ft to T.D.



Notes: All depths are referenced to side-scan. Downview lense is 5" below side-scan.

800.919.7555
909.625.6262

4456 via st. ambrose
claremont ca 91711

fax: 909.399.3180

Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle
ADDRESS: UNKOWN
CONTACT: David Conner **PHONE:** 619.726.7311
JOB LOCATION: Pasadena Ca.
GPS LOCATION: Latitude: N ° | Longitude: W °

WELL NUMBER: 52 **JOB NUMBER:** 1000-1227

SURVEYED BY: Tim Narwold **DATE:** 15-Jul-09

REVIEWED BY: **WATER LEVEL:** 79.1'

WATER CONDITION: Clear/Cloudy **TOTAL DEPTH:** Unkown

CASING DIAMETER: 20.0" ID **SURVEY DEPTH:** 619.9'

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
0-79'	Casing has light scale
79-250'	Casing has heavy scale and growth
250-619'	Casing has heavier scale and growth with nodules
	and tubeler growth
500'	Possible air line in well
619'	Camera enters fill from side perspecive

Perforation:	
Horizontal	248 to 370'
Louver	375 to 619'

Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

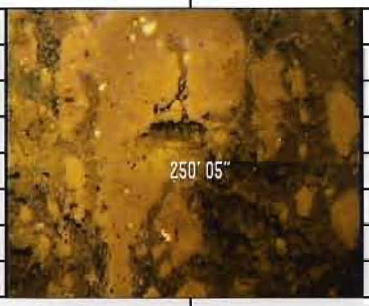
CLIENT: Battelle - JPL Pasadena
ADDRESS: UNKNOWN
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena Ca.
GPS LOCATION: Latitude: N 34° 11' 46.2" | Longitude: W 118° 10' 03.8"

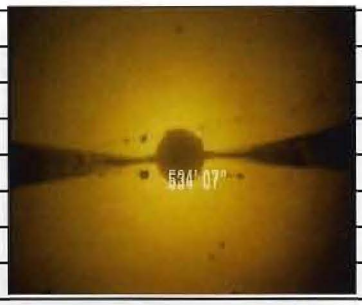
WELL NUMBER: # 52 **JOB NUMBER:** 27-1227
SURVEYED BY: Tom Schuldheisz **DATE:** 5-Aug-09
REVIEWED BY: **WATER LEVEL:** 81' 03"
WATER CONDITION: Clear/Cloudy **TOTAL DEPTH:** Unknown
CASING DIAMETER: 20.00" ID **SURVEY DEPTH:** 611' 02"

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
0 - 81'	Casing appears to have mild scale and growth.
1' 05"	Access port enters casing.
81' - 100'	Casing appears to have mild scale and growth.
100' - 270'	Casing appears to have moderate scale and growth.
250' 05"	Casing appears to have corrosion at the seam.
270' - 611'	Casing appears to have mild scale and growth.
530' - 580'	Poor visibility in water.
580' - 611'	Moderate visibility in water.
611' 02"	Camera comes to rest at fill from the side perspective.

Perforation:	
Horizontal	248 to 370'
Louver	375 to 400'





Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Battelle
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena Ca.
GPS LOCATION: Latitude: N 34° 11' 46.2" | Longitude: W 118° 10' 03.8"

WELL NUMBER: # 52 **JOB NUMBER:** 1000-1968

SURVEYED BY: Jeff Conner **DATE:** 15-Sep-10

REVIEWED BY: **WATER LEVEL:** 70

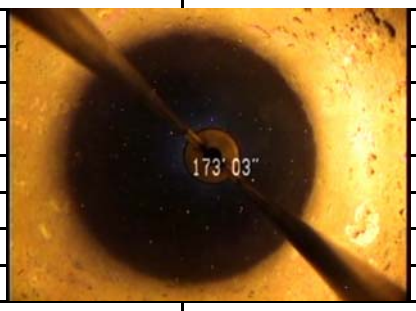
WATER CONDITION: Clear **TOTAL DEPTH:** Unknown

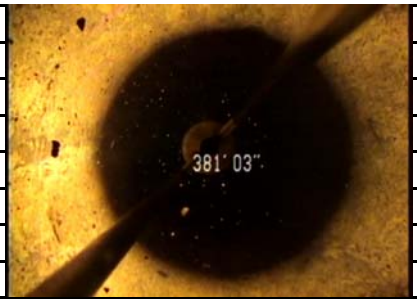
CASING DIAMETER: 20.00" ID **SURVEY DEPTH:** 638' 7"

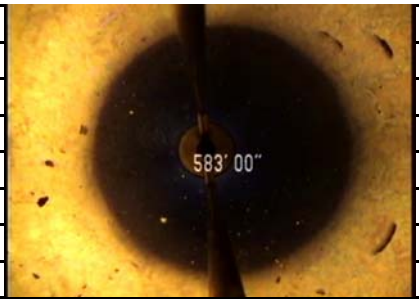
*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
0 - 70'	Casing appears to have mild scale and growth.
1' 05"	Two access ports enters casing.
70'	Camera enters static water level.
70 - 638'	Casing appears to have mild scale and growth.
638' 7"	Camera comes to rest at fill.

Perforation:	
Horizontal	245 - 630'
Louver	







Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: JPL - Battelle
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena Ca.
GPS LOCATION: Latitude: N 34° 11' 46.2" | Longitude: W 118° 10' 03.8"

WELL NUMBER: # 52 **After Liner** **JOB NUMBER:** 1000-1968

SURVEYED BY: Jeff Conner **DATE:** 30-Nov-10

REVIEWED BY: **WATER LEVEL:** 64' 1"

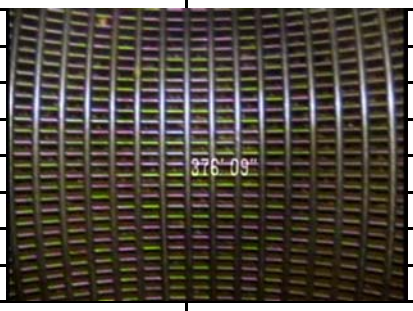
WATER CONDITION: Clear **TOTAL DEPTH:** Unknown

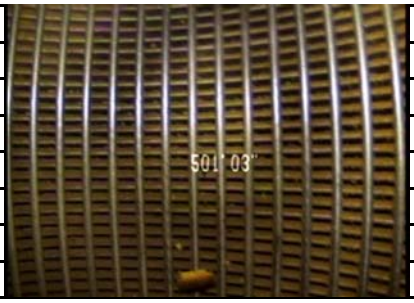
CASING DIAMETER: 15.75" ID **SURVEY DEPTH:** 638' 7"

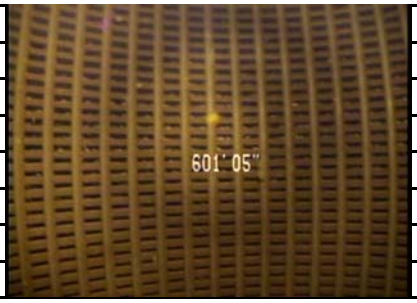
*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
1' 4"	Access port enters casing.
1' 10"	Liner begins.
1 - 64'	Casing appears to have mild scale and growth.
64' 1"	Camera enters static water level.
64 - 255'	Casing appears to have mild scale and growth.
255'	Camera transitions from mild steel to stainless.
255 - 613'	Casing appears to have mild growth, gravel is visible behind screen.
613'	Camera comes to rest on top of fill.

Perforation:	
Stainless Steel Wire Wrap	255 - 615'







Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: JPL - Battelle
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena Ca.
GPS LOCATION: Latitude: N 34° 11' 46.2" | Longitude: W 118° 10' 03.8"

WELL NUMBER: # 52 **General Inspection** **JOB NUMBER:** 1000-1968

SURVEYED BY: Jeff Conner **DATE:** 1-Jun-11

REVIEWED BY: **WATER LEVEL:** 40' 7"

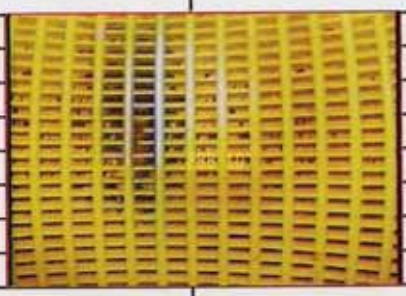
WATER CONDITION: Clear **TOTAL DEPTH:** 638' 7"

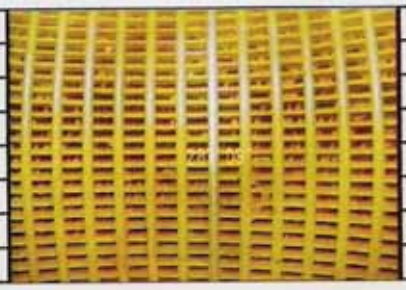
CASING DIAMETER: 15.75" ID **SURVEY DEPTH:** 474'

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
1' 4"	Access port enters casing.
1' 10"	Liner begins.
1 - 40'	Casing appears to have mild scale and growth.
40' 7"	Camera enters static water level.
40 - 400'	Casing appears to have mild scale and growth.
	Large voids of gravel pack behind screen.
255'	Camera transitions from mild steel to stainless.
288' 10"	Casing appears to have thinned.
400 - 450'	Casing appears to have mild growth with more
	material rested on perforations.
450 - 474'	Casing appears to have very mild growth with materal
	on perfoations.
474'	Camera comes to rest on top of fill.

Perforation:	
Stainless Steel Wire Wrap	257 - 615'





Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: JPL - Battelle
ADDRESS: Unknown
CONTACT: David Conner **PHONE:** 619-726-7311
JOB LOCATION: Pasadena Ca.
GPS LOCATION: Latitude: N 34° 11' 46.2" | Longitude: W 118° 10' 03.8"

WELL NUMBER: # 52 **After Air Lift** **JOB NUMBER:** 1000-1968

SURVEYED BY: Jeff Conner **DATE:** 13-Jun-11

REVIEWED BY: **WATER LEVEL:** 50' 8"

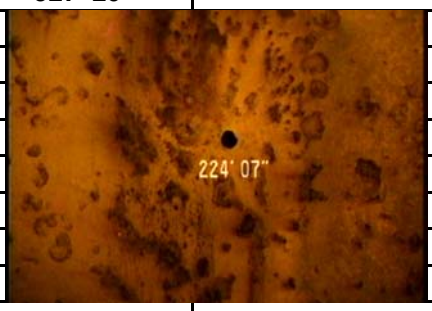
WATER CONDITION: Clear **TOTAL DEPTH:** 615' (Liner)

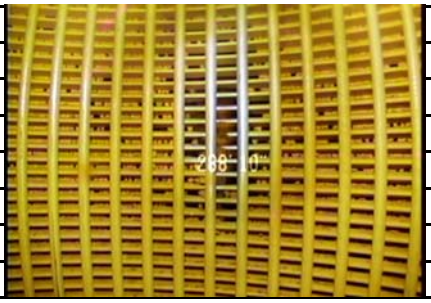
CASING DIAMETER: 15.75" ID **SURVEY DEPTH:** 617' 10"

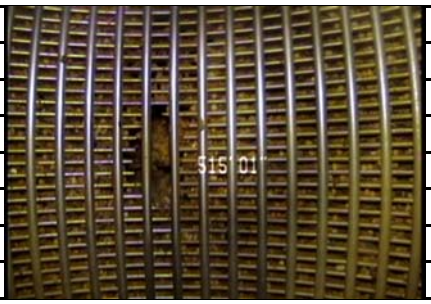
*All Depths Shown are relative to the center of the side camera perspective.

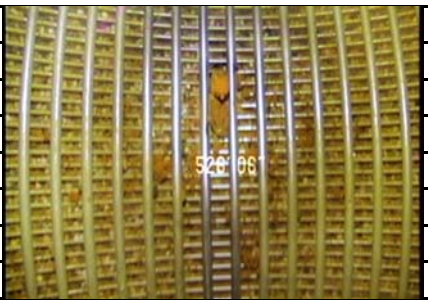
DEPTH	REMARKS
1' 4"	Access port enters casing.
1' 10"	Liner begins.
1 - 50'	Casing appears to have mild scale and growth.
50' 8"	Camera enters static water level.
50 - 526'	Casing appears to have mild scale and growth.
	Large voids of gravel pack behind screen.
255'	Camera transitions from mild steel to stainless.
224' 7"	Small hole in blank casing.
288' 10"	Casing appears to have thinned.
484' 8"	Casing appears to have thinned in 2 spots.
515' 1"	Casing appears to have thinned a large hole.
526' 6"	Casing appears to may have thinned behind debris.
526 - 617'	Casing appears to have gravel pressed against it from the inside.
617' 10"	Camera comes to rest at fill.

Perforation:	
Stainless Steel	257 - 617'
Wire Wrap	









Pacific Surveys

a full service geophysical well logging company

Video Survey Report

Company:	Layne Christensen		**Date:**	20-Jun-11	
Well:	City of Pasadena Well # 52		**Run No.**	One	**Truck** PS-4
Field:	Upper Arroyo Canyon		**Job Ticket:**	15977	
State:	California		**Total Depth:**	606 ft	
			Water Level:	40 ft	SWL
Location:	GPS N34o11.770' W118o10.067'		**Oil on Water:**	No	**Amount:** 0"
			Operator:	Nelson	
Zero Datum:	Top of Liner	**Tool Zero:**	Side-Scan		**Dead Space** 2.00 ft
Reason for Survey:	General Inspection		**Guides Set @**	15.00 "	

Depth	Observations		
0.0 ft	Start survey at top of liner.	**Perforation:**	**From Survey**
39.8 ft	SWL; Water clear.	Wire-Wrap	253.70 ft to ?
87.6 ft	Casing joint.		
221.4 ft	Hole in casing wall.		
253.4 ft	Casing change to stainless steel.		
253.7 ft	Top of screen; appears open.		
285.0 ft	Hole in screen.		
350.0 ft	Screen appear open.		
400.0 ft	Screen appears normal.		
480.7 ft	Hole in screen.		
498.3 ft	Possibly start of thinning of screen.		
511.0 ft	Hole in screen.	**Casing Size**	**From Survey**
522.2 ft	Hole in screen.	**15.75 in**	0.00 ft to 606.40ft
560.0 ft	Water becomes cloudy.		
561.0 ft	Fine material in screen.		
606.4 ft	Fill; fine material still in screen. End survey.		
		Casing Material	Mild Steel
		Screen Material	SST

800.919.7555
909.625.6262

4456 via st. ambrose
claremont ca 91711
www.pacificsurveys.com

fax: 909.399.3180

APPENDIX 2-9: Water Systems Engineering Lab Reports for Well 52

Water Systems Engineering Inc.
3201 Labette Terrace
P.O. Box 700
Ottawa, KS 66067-0700
Phone: 785-242-6166
Fax: 785-242-9411

WATER TREATMENT ANALYSIS AND CONTROL REPORT

David J. Conner
Battelle Memorial Institute
4800 Oak Grove Drive M/S 180-801
Pasadena, CA 91109

Date: May 26, 2010

Lab Report No. 18468

RE: City of Pasadena, Well No.52; Samples dated 5/6/10
Complete Profile (1); P.O. #216906

NA - Not Applicable
ND - Not Detected
*(as $CaCO_3$)

	WELL NO.52		Detection Limits
	54" BGS mg/l	440' BGS mg/l	
pH Value	7.82	7.66	NA
Phenolphthalein Alkalinity*	ND	ND	4 mg/L
Total Alkalinity*	176	180	4 mg/L
Hydroxide Alkalinity	ND	ND	4 mg/L
Carbonate Alkalinity	ND	ND	4 mg/L
Bicarbonate Alkalinity	176	180	4 mg/L
Total Dissolved Solids	530	567	1.0 mg/l
Conductivity (µm or µS/cm)	736	787	NA
ORP (mV)	371	371	0.1 mV
Langelier Saturation Index	+ 0.12	- 0.04	NA
Total Hardness*	292	320	4 mg/L
Carbonate Hardness	176	180	4 mg/L
Non Carbonate Hardness	116	140	4 mg/L
Calcium*	184	208	4 mg/L
Magnesium*	108	112	4 mg/L
Sodium (as Na)	21.2	20.2	5.0 mg/L
Potassium (as K)	2.3	2.4	0.1 mg/L
Chlorides (as Cl)	68.0	72.8	2 mg/L
Nitrate (Nitrogen)	9.8	11.1	0.3 mg/L
Chlorine (as Cl)	ND	ND	0.02 mg/L
Dissolved Iron (as Fe^{2+})	ND	ND	0.02 mg/L
Suspended Iron (as Fe^{3+})	1.00	0.99	0.02 mg/L
Iron Total (as Fe)	1.00	0.99	0.02 mg/l
Iron (resuspended)	3.83	3.04	0.02 mg/l
Copper (as Cu)	ND	ND	0.04 mg/L
Manganese (as Mn)	2.0	1.1	0.1 mg/L
Phosphate (as PO_4)	0.16	0.46	0.06 mg/L
Sulfate (as SO_4)	62	72	2 mg/L
Silica (as SiO_2)	24.8	30.4	1.0 mg/L
Tannin/Lignin	0.3	0.1	0.1 mg/L
Total Organic Carbon (C)	0.2	0.1	0.0 mg/L

Bacterial Analysis:

F = Filtered M = Million	WELL NO.52 54' BGS	440' BGS
Plate Count (colonies/ml)	>1,500	131
Anaerobic Growth	<10%	10%
Sulfate Reducing Bacteria	Negative	Negative
Fe / Mn Oxidizing Bacteria	Negative	Positive
ATP (cells per ml) Initial	1.4 M 795,000 (F)	1.7 M 1.3 M (F)
ATP (cells per ml) 24 hour	1.9 M 1.4 M (F)	1.3 M 1.0 M (F)
Total Coliform Bacteria	Negative	Positive 2 / 10 ml
E. coli Coliform Bacteria	Negative	Negative

Bacterial Identification:

54': *Acinetobacter venetianus, Bacillus specie*

440': *Gallionella, Acinetobacter venetianus, Microbacterium laevaniformans*

Microscopic Evaluation:

54': Moderate to heavy visible bacterial activity with minor number of protozoa, trace of crystalline debris and plant particulate matter, moderate iron oxide.

440': Extremely heavy visible bacterial activity, trace of plant particulate matter, minor amount of crystalline debris, moderate iron oxide with trace of Gallionella.

Observations and Interpretations:

When received in the lab both samples were clear and free of sediment. Chemical analysis produced generally consistent results between the 54-foot and 440-foot samples. The analysis found high hardness with a significant non-carbonate hardness component present. Alkalinity was moderate with a neutral pH. Total dissolved solids and conductivity were moderately high. The oxidation-reduction potential indicates an oxidative condition existing within the well. The calculated Langelier Saturation Index indicates a balanced condition exists with respect to the calcium carbonate content.

Chemical analysis found nearly all analytes present at levels above what is typically found in ground water although this level of mineralization in the aquifer is likely typical for this geochemical environment. Iron as total iron and suspended iron were slightly elevated in both samples but the resuspended iron was considerably high in both samples. Resuspended iron is the result of chemically oxidized as well as biologically mobilized iron and can be an indication of overall bacterial activity.

Overall there appears to be a high level of mineralization in the natural groundwater at this location. The level of alkalinity combined with the heavy mineralization and alkaline pH indicates a potential for mineral scale formation both in the form of carbonate and sulfate precipitation.

Bacterial analysis found over 1,500 colony forming cells per milliliter in the 54-foot sample. The dominant organisms were identified as *Acinetobacter venetianus;* and *Bacillus specie*, both of which are considered non-pathogenic organisms. They are widely distributed in nature including in soils and decaying vegetation. One hundred thirty one colony forming cell per milliliter was identified in the 440-foot sample. The organisms were also identified as typical non-pathogenic organisms widely dispersed in the natural environment.

Anaerobic organisms were present at less than 10% of the total population in the 54-foot sample and 10% in the 440-foot sample. This increase in anaerobic organisms in the deeper potion of the well may be due to more stagnant conditions found in the deeper portions of the well. Both samples tested negative for sulfate reducing organisms as well as total coliforms including E-coli. Adenosine triphosphate (ATP) which is a measure of the total amount of cellular material present in the samples was excessive in both samples. Any value over 100,000 is of concern for bacterial congestion. After filtering through a 3 micron filter to remove biomass and larger organisms the counts remained excessively high for an active well system.

The microscopic evaluation identified moderate to heavy levels of visible bacterial activity in the 54-foot sample along with moderate levels of iron oxide based biofilm. Very low levels of plant particulate matter and multicellular organisms were also observed in the 54-foot sample. Microscopic analysis of the 440-foot sample found extreme levels of visible bacterial activity with moderate levels of iron oxide biofilm and very low levels of the iron oxidizing bacteria *Gallionella*.

The dominant bacterial organism identified in the microscopic evaluation was *Gallionella. Gallionella* are a larger, stalked bacterium that utilize iron as an energy source and secrete an iron-oxy-hydroxide byproduct. This secretion is often responsible for accumulations of iron oxide in wells and piping systems. Furthermore, the stalked nature of the bacteria rapidly clogs well screens and pump intakes, reducing flow into and out of wells. The secreted stalks are often shed during cycling of the well, resulting in surges of red water and spikes in total iron readings. *Gallionella* are known to migrate beyond the well system and can foul transmission lines and filter systems. *Gallionella* are a naturally occurring bacteria found in a variety of aquatic environments including aquifers. In addition to fouling concerns, *Gallionella* are a chief form of microbial induced corrosion. In its attachment to iron bearing surfaces, *Gallionella* pits the metal in an effort to secure the iron necessary for energy. All iron bearing structures, including stainless steel, are susceptible to this form of pitting.

The *Gallionella* occurrence is of concern beyond biofouling capability. As accumulations of the iron-oxy-hydroxide stalks build within the well, the base layers tend to dehydrate, resulting in a harder, more dynamic iron oxide scale. These scale accumulations are very

effective fouling mechanisms within the well and pump. High *Gallionella* populations typically result in a higher degree of required pump maintenance due to fouling of the intakes and iron oxide accumulations within the pump bowls.

Very low levels of plant particulate matter were also present as well as low levels of crystalline material but no multicellular organisms were observed.

In summary, the chemistry of both water samples indicated fairly high mineralization with a moderate potential for mineral scale formation. The high biological load in the samples indicates significant bacterial congestion. Biofouling will also act as a catalyst for mineral scale accumulation, increasing the potential for encrustation and plugging within the well environment.

Since the well has been inactive no performance data is available, but since a high level of bacterial growth is currently present, conducting a thorough cleaning and disinfection of the well should reduce the potential problems associated with the heavy bacterial population once the well is put back into service. This is particularly important since *Gallionella* is currently present and will likely increase with pumping (fresh oxygenated water and food sources are brought in), as well as the potential for manganese oxidizing organisms to develop due to the high manganese content. Although it was not identified under the microscope, the manganese oxidizing organism *Liptrothrix* is commonly associated with *Gallionella* and can lead to additional biofouling.

The cleaning process should begin with inspecting the well to insure its integrity prior to cleaning. This will determine if the well casing or surface seal has been compromised allowing multicellular organisms associated with the near surface environment and plant particulate matter to enter the well. Provided that the well is structurally sound, the well should be cleaned with a mild acid solution combined with a dispersion polymer being mechanically worked into the screened sections followed by a multi-volume disinfection effort using a pH stabilized chlorine solution.

The interpretations and recommendations presented are based on an evaluation of the water samples and submitted data. The recommended treatment is based on laboratory and field evaluations of similar fouling occurrences within potable well systems. Further investigative efforts, such as a pump test, video survey, or other evaluation methods may offer additional insight into the well's condition and the degree of fouling.

We appreciate the opportunity to be of service, and, if you have any questions concerning this report, do not hesitate to contact me at 913.707.5926.

Sincerely,
Water Systems Engineering, Inc.

Paul D. Buozis
Professional Geologist

Water Systems Engineering Inc.
3201 Labette Terrace
P.O. Box 700
Ottawa, KS 66067-0700
Phone: 785-242-6166
Fax: 785-242-9411

WATER TREATMENT ANALYSIS AND CONTROL REPORT

David J. Conner
Battelle Memorial Institute
65 West Dayton St. - #407
Pasadena, CA 91105

Date: November 16, 2010

Lab Report No. 18672

Re: City of Pasadena, Well 52; samples 235' and 430'; samples dated 11/2/10
Complete Profile (1); P.O. #216906

NA - Not Applicable
ND - Not Detected
*(as $CaCO_3$)

	WELL NO.52		Detection Limits
	235' mg/l	430' mg/l	
pH Value	7.04	6.88	NA
Phenolphthalein Alkalinity*	ND	ND	4 mg/L
Total Alkalinity*	156	100	4 mg/L
Hydroxide Alkalinity	ND	ND	4 mg/L
Carbonate Alkalinity	ND	ND	4 mg/L
Bicarbonate Alkalinity	156	100	4 mg/L
Total Dissolved Solids	526	444	1.0 mg/l
Conductivity (µm or µS/cm)	730	617	NA
ORP (mV)	442	455	0.1 mV
Langelier Saturation Index	-0.66	-1.12	NA
Total Hardness*	268	216	4 mg/L
Carbonate Hardness	156	100	4 mg/L
Non Carbonate Hardness	112	116	4 mg/L
Calcium*	180	148	4 mg/L
Magnesium*	88	68	4 mg/L
Sodium (as Na)	30.0	29.6	5.0 mg/L
Potassium (as K)	2.6	2.5	0.1 mg/L
Chlorides (as Cl)	68	70	2 mg/L
Nitrate (Nitrogen)	9.9	9.6	0.3 mg/L
Chlorine (as Cl)	ND	0.3	0.02 mg/L
Dissolved Iron (as Fe^{2+})	ND	ND	0.02 mg/L
Suspended Iron (as Fe^{3+})	0.09	0.15	0.02 mg/L
Iron Total (as Fe)	0.09	0.15	0.02 mg/l
Iron (resuspended)	0.10	0.37	0.02 mg/l
Copper (as Cu)	ND	ND	0.04 mg/L
Manganese (as Mn)	ND	0.1	0.1 mg/L
Phosphate (as PO_4)	2.05	3.50	0.06 mg/L
Sulfate (as SO_4)	71	65	2 mg/L
Silica (as SiO_2)	43.6	60.1	1.0 mg/L
Tannin/Lignin	ND	ND	0.1 mg/L
Total Organic Carbon (C)	0.1	0.3	0.0 mg/L

Bacterial Analysis:

F = Filtered M = Million	WELL NO.52 **235'**	 **430'**
Plate Count (colonies/ml)	>1,500	>1,500
Anaerobic Growth	15%	15%
Sulfate Reducing Bacteria	Negative	Negative
Fe / Mn Oxidizing Bacteria	Negative	Negative
ATP (cells per ml) Initial	21,000	96,000
ATP (cells per ml) 24 hour	20,000	401,000
Total Coliform Bacteria	Negative	Negative
E. coli Coliform Bacteria	Negative	Negative
Bacterial Identification	*Acinetobacter junii*	*Pseudomonas alcaligenes; Actinomycete*

Microscopic Evaluation:

235': Light visible bacterial activity, large number of crystals, trace of iron oxide.

430': Light visible bacterial activity, extremely large number of crystals, trace of iron oxide.