URS

Memorandum

To: Mr. Emmanuel Martin (City of Torrance)
Mr. John Dettle (City of Torrance)

From: Brian Partington (URS – Santa Ana, CA)

Date: October 1, 2013

Subject: **PRELIMINARY WELL DESIGN FOR PILOT BORING #13**
LA CARRETERA PARK (186TH STREET EAST OF VAN NESS AVE.)

Cc: Joe Liles (URS – Santa Ana, CA)
Jon Sanks (URS – Santa Ana, CA)
Project Files (URS – Santa Ana, CA)
Project Number 29869072.00007

URS Corporation (URS) prepared this memorandum to communicate a preliminary well design for a pilot boring (#13) recently completed at La Carretera Park (186th Street east of Van Ness Avenue) in Torrance, California (the Site). The site location is shown on Figure 1. The preliminary well construction details are shown on Figure 2. The well construction details are summarized as follows:

Construction Parameter	Depth (ft bgs)	Description	
BORING DETAILS			
Conductor Casing (completed)	0 to 50	Diameter Composition Length Type Thickness	36" OD Carbon Steel 50' Minimum Welded Steel 3/8"
Reamed Borehole	0 to 51 51 to 175 175 to 660	44" diameter (completed) 32" diameter (to allow room for gravel chute) 28" diameter (sufficient to allow sounding tubes)	
CASING AND SCREEN			
Blank Casing Roscoe Moss Company	0 to 185 210 to 270 320 to 420 640 to 650	Diameter Composition Thickness	18" OD Stainless Steel 304L 5/16"
Well Screen: Ful-Flo Louver Roscoe Moss Company	185 to 210 270 to 320 420 to 640	Diameter Composition Slot Thickness	18" OD Stainless Steel 316L 0.050" 5/16"
Bottom Cap Roscoe Moss Company (or equivalent)	650	Shape Composition	Semi-Elliptical Stainless Steel 304L
Cement Seal	0 to 150	Per specifications provided by City of Torrance	
Bentonite Seal (3/8" Chip)	150 to 160	Preventative Measure for Potential Grout Migration (minimum hydration 4 hours)	
Gravel Envelope Oglebay Norton Industrial Sands (or similar)	160 to 660	Size Distribution Uniformity Coefficient Thickness (minimum)	8 x 16 2.0 – 3.0 5"

Construction Parameter	Depth (ft bgs)	Description	
ANCILLARY EQUIPMENT			
Vent Tubes (two)	0 to 6.5 (each)	Diameter Composition Connections Orientation	2" Standard Stainless Steel 304L Threaded & Coupled Opposite Corners
Sounding Tubes (two)	0 to 318 (each)	Diameter Composition Connections Orientation	2" Standard Stainless Steel 304L Welded Collar-Interior Opposite Corners
Gravel Chute (one)	0 to 165	Diameter Composition Orientation Connections Orientation	3" Standard Stainless Steel 304L Opposite of Discharge Welded Collars Opposite of Discharge

The well design was based on soil descriptions from the pilot boring (Attachment A), geophysical logging that confirmed subsurface stratigraphy (Attachment B), sieve analysis performed on the finest sediments present with the proposed screen interval (Attachment C), and water quality results for isolated aquifer zone testing (Attachment D).

URS identified three potential water bearing zones that generally correlate with the aquifer depths anticipated beneath the Site. The aquifers listed in order of depth (shallow to deep) presumably include the Gardena, Lynwood, and Silverado. An abundance of fine-grained sediments (i.e., silty sands) were identified within the water bearing zones, most notably the upper portion of the Lynwood and lower portion of the Silverado. As such, a conservative filter pack material was selected to minimize the entry of fine-sands / silty-sands and was confirmed with the recommended screen manufacture (Roscoe Moss Company).

Nearly all water quality data obtained during zone testing were below the applicable water quality standards for California. One sample was equal to the secondary water quality secondary for color (15 color units from Zone #2).

A screen interval was proposed for the upper most water bearing zone tested to maximize the well yield (assumed to be the Gardena Aquifer). However, the installation of the shallow screen interval and gravel envelope placement may need to be discussed further due local groundwater impacts associated with nearby contaminated properties, most notably Honeywell. The Regional Water Quality Control Board (RWQCB) approved a work plan to delineate at least one of the groundwater plumes (Attachment E).

LIMITATIONS

These recommendations have been prepared for the City of Torrance. The design was prepared specifically for the installation of a water production well at pilot boring #13 (Torrance, California). These recommendations have been prepared in accordance with the care and skill generally exercised by reputable professionals, under similar circumstances, in this or similar localities. No other warranty, expressed or implied, is made as to the professional opinions presented herein. No other party, known or unknown to URS Corporation is intended as a beneficiary of this work product, its content or information embedded therein. Third parties use this report at their own risk. URS Corporation assumes no responsibility for the accuracy of information obtained from, compiled or provided by outside sources.

Changes in site use and conditions of the proposed well design may occur with reduction in specific capacity, groundwater elevations, pumping operations, and maintenance procedures. The proposed design assumes that there would be adequate yield from the formation material to preclude pumping rates from drawing water down below the well screen to avoid cascading water and associated deterioration of the stainless steel screen. The assumptions were made prior to the completion of a groundwater pumping test and with only limited zone production testing per direction from the City of Torrance. More detailed well pumping recommendations will be provided upon completion of the groundwater pumping test. In addition, it should be noted that initial stages of water development and production may result in turbidity that is higher than usual due to the fine-grained nature of the sediments identified in pilot boring #13.

If you have any questions regarding this memorandum please do not hesitate to contact me at 714-648-2803.

Sincerely,

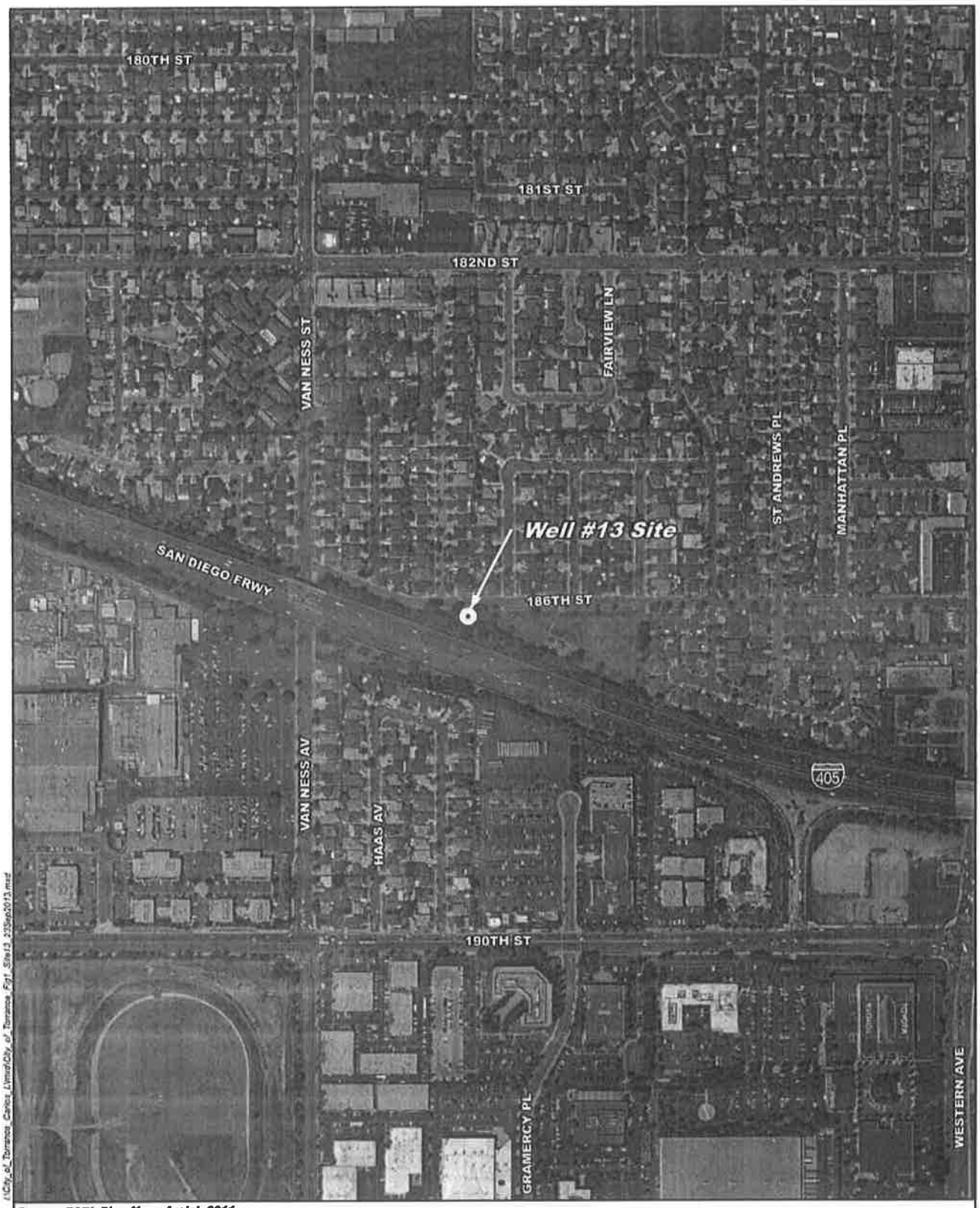
URS CORPORATION

Brian Partington, PG, CHG
Project Manager / Principal Hydrogeologist

Attachments:

Figure 1	Site Location Map
Figure 2	Preliminary Well Design for Pilot Boring #13
Attachment A	Draft Soil Boring Log for Pilot Boring #13
Attachment B	Geophysical Log by Pacific Surveys, Inc.
Attachment C	Sieve Analysis Performed by URS
Attachment D	Water Quality Analysis for Isolated Aquifer Zone Testing
Attachment E	Work Plan to Delineate Groundwater Plume (Honeywell Facility)

FIGURES



Source: ESRI, Bing Maps Aerial, 2011.

N

0 250 500
Feet

City of Torrance
Site Map
Figure 1 Well #13

September 2013

URS

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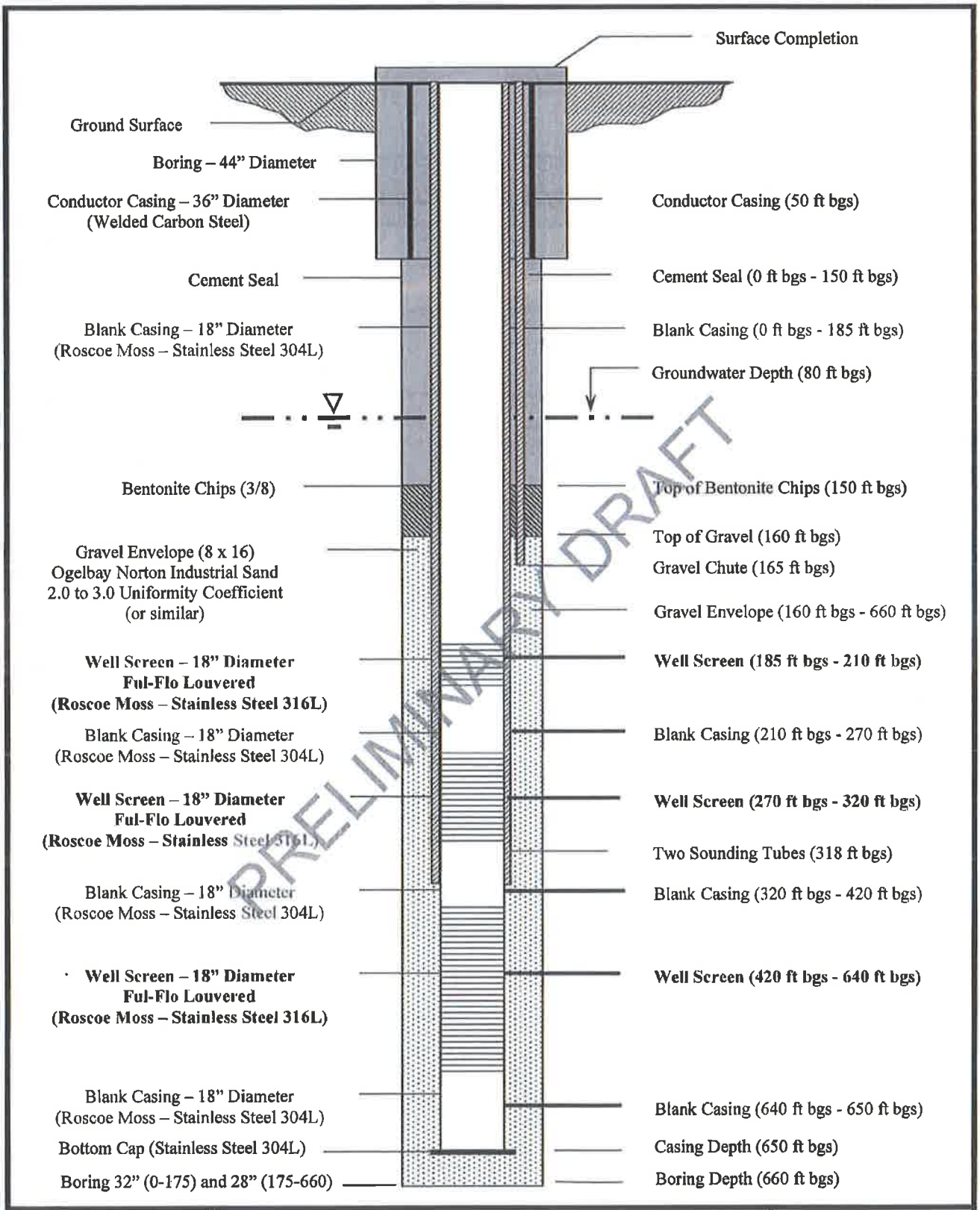

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Preliminary Construction Details for Well #13
(La Carretera Park - 186th Street east of Van Ness Avenue)

Figure 2

6T:\2013\City of Torrance\Deliverables\01. #13\01. Well Design Memo (#13)\Figures\Figure 2--Preliminary Design (COT#13).doc

ATTACHMENT A

Draft Soil Boring Log for Pilot Boring #13

Project: City of Torrance - Department of Public Works **Project Location:** La Carretera Park **Project Number:** 29869072	**Log of Boring Pilot Boring #13** Sheet 1 of 9

Date(s) Drilled: 07/25/13 (Bucket Auger), 08/07/13 - 08/12/13 (Reverse Rotary)	Logged By: J. Sanks (PG 8782) (0'-920')	Checked By: B. Partington (PG 7612)
Drilling Method: Bucket Auger (0-50'), Reverse Rotary (50-910'),	Drilling Contractor: Barney's (Bucket Auger), Southwest (Reverse Rotary)	Total Depth of Borehole (feet): 920.0
Drill Rig Type: Reverse Rotary	Borehole Diameter (inches): NA	Approx. Surface Elevation (feet msl): See Survey
Approximate Depth to Groundwater (ft bgs): NA	Sampler Type: Grab Samples	Borehole Backfill: NA
Comments: Conductor casing installed on 07/25/13 to 50 ft bgs.		

Elevation, feet MSL	Depth, feet	SAMPLES: Type	SAMPLES: Sample Time	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	0				Brown (10YR 4/3) silty fine SAND (SM), moist.				
	5								07/25/13
	10				SAA			0935	
	15								
	20				Brown (10YR 4/3) silty fine SAND (SM), moist.			1000	
	25								
	30				Yellowish Brown (10YR 5/4) fine SAND (SP), moist.			1018	
	35								
	40							1035	
	45				Yellowish Brown (10YR 5/4), CLAY (CL), moist.				
	50				Brown (10YR 4/3), silty fine SAND (SM), moist.			1315	08/07/13
	55								
	60				Grayish brown (10YR 6/2), fine SAND (SP), moist.			1345	
	65								
	70				Gray (10YR 5/1), silty fine SAND (SM), moist, contains trace clay.			1000	
	75								
	80				Grayish brown (10YR 5/2), fine to medium SAND (SP), moist, contains trace clay.			1841	
	85								
	90				Gray (10YR 5/1), CLAY (CL).			2030	
	95								
	100								

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Project: City of Torrance - Department of Public Works
Project Location: La Carretera Park
Project Number: 29869072

Log of Boring Pilot Boring #13

Sheet 2 of 9

Elevation, feet MSL	Depth, feet	SAMPLES Type	SAMPLES Sample Time	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	100				Light brownish gray (10YR 6/2), CLAY (CL).			2114	08/08/13
	105								
	110				Gray (10YR 6/1), CLAY (CL).			2250	
	115								
	120				Contains trace fine sand.			0100	
	125								
	130				Grayish brown (10YR 5/2), fine SAND (SP).			0244	
	135								
	140				Sand becomes medium, contains trace cla			0455	
	145								
	150				Decrease clay.			0615	
	155								
	160				Sand becomes fine.			0830	
	165								
	170				SAA			1015	
	175								
	180				SAA			1215	
	185								
	190				Becomes gray (10YR 5/1).			1300	
	195								Zone Test # 4 195 Ft to 215 Ft (1.3 gpm/ft)
	200				Becomes coarse-grained			1317	
	205								
	210				Dark gray (10YR 4/1), Clayey SAND (SC).			1330	
	215								

Project: City of Torrance - Department of Public Works
Project Location: La Carretera Park
Project Number: 29869072

Log of Boring Pilot Boring #13

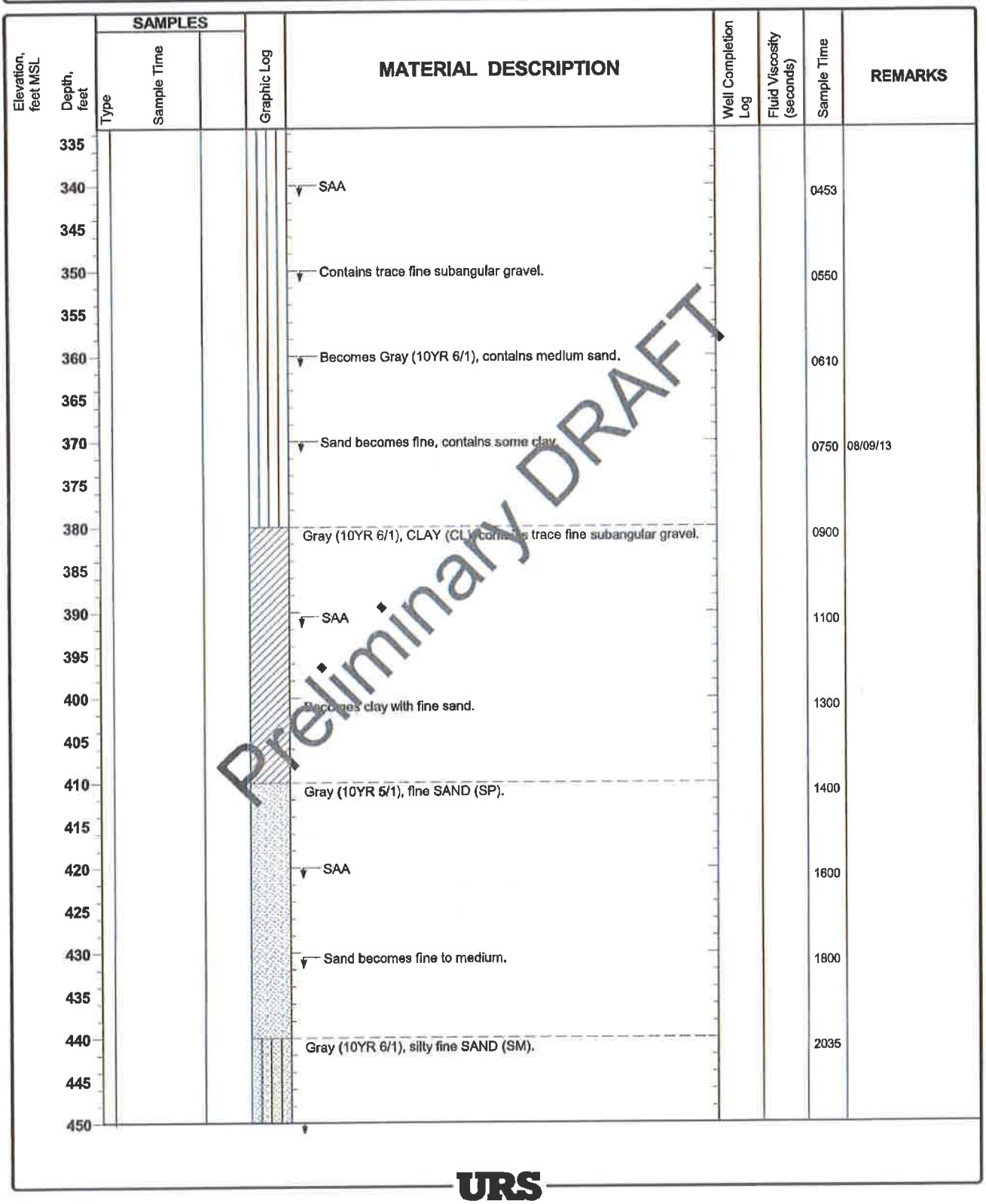
Sheet 3 of 9

Elevation, feet MSL	Depth, feet	SAMPLES Type	SAMPLES Sample Time	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	220				Dark gray (10YR 4/1), CLAY (CL).			1420	
	225								
	230				Decrease clay content, fine to medium sand.			1450	
	235								08/08/13
	240				Increase clay content.			1545	
	245								
	250				Sand becomes fine to coarse.			1618	
	255								
	260				Dark gray (10YR 4/1), Clayey SAND (SC).			1639	
	265								
	270				Increase sand content, contains trace shells.			1720	
	275								Zone Test # 3 275 Ft to 295 Ft (11 gpm/ft)
	280				Gray (7.5YR 5/1), medium to coarse SAND (SP), contains trace fine, sub rounded gravel.			1830	
	285								
	290				SAA			1920	
	295								
	300				SAA			2023	
	305								
	310				Gray (10YR 5/1), silty fine SAND (SM).			0106	08/09/13
	315								
	320				SAA			0207	
	325								
	330				Gray (10YR 5/1), sandy SILT (ML), fine sand and contains trace shells.			0330	

Project: City of Torrance - Department of Public Works
Project Location: La Carretera Park
Project Number: 29869072

Log of Boring Pilot Boring #13

Sheet 4 of 9



Project: City of Torrance - Department of Public Works Project Location: La Carretera Park Project Number: 29869072	**Log of Boring Pilot Boring #13** Sheet 5 of 9

Elevation, feet MSL	Depth, feet	SAMPLES Type	SAMPLES Sample Time	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	450				SAA; Increase fine sand content.			2307	
	455								Zone Test # 2 456 Ft to 476 Ft (1.0 gpm/ft)
	460				Dark gray (10YR 4/1), fine to medium SAND (SP).			0007	08/10/13
	465								
	470				Gray (10YR 6/1), fine to medium subrounded to subangular gra			0300	
	475								
	480				Dark gray (10YR 6/1), medium to coarse sand (SP).			0430	
	485								
	490				Dark gray (10YR 6/1), medium to sub unded gravel (GP).			0620	
	495								
	500				SAA			0900	08/10/13
	505								
	510				SAA			1200	
	515								
	520				Contains some clay.			1500	
	525								
	530				Gray (10YR 6/1), medium to coarse SAND (SP).			1800	
	535								
	540				Contains some clay.			2029	
	545								
	550				Gray (10YR 6/1), medium SAND (SP).			2245	
	555								
	560				Becomes sand with clay.			0000	08/11/13
	565								

Project: City of Torrance - Department of Public Works
Project Location: La Carretera Park
Project Number: 29869072

Log of Boring Pilot Boring #13

Sheet 6 of 9

Elevation, feet MSL	Depth, feet	SAMPLES Type	SAMPLES Sample Time	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	570				Gray (10YR 6/1), Silty fine to coarse SAND (SM).			0135	
	575								Zone Test # 1 (Dry)
	580				SAA			0511	
	585								
	590				Becomes sand with clay.			0601	
	595								
	600				Becomes fine sand with clay.			0715	
	605								
	610				Decrease clay contains.			0845	
	615								
	620				Increase clay content			1030	
	625								
	630				SAA			1245	
	635								08/11/13
	640				Decrease sand content.			1405	
	645								
	650				Dark gray (10YR 6/1), SILT (ML) with fine sand.			1516	
	655								
	660				SAA			1631	
	665								
	670				SAA			1806	
	675								
	680				Increase sand content.			1945	

Project: City of Torrance - Department of Public Works
Project Location: La Carretera Park
Project Number: 29869072

Log of Boring Pilot Boring #13

Sheet 7 of 9

Elevation, feet MSL	Depth, feet	SAMPLES Type	SAMPLES Sample Time	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	685								
	690				Decrease sand content.			2020	
	695								
	700				Dark gray (10YR 6/1), CLAY (CL) with fine sand.			2100	
	705								
	710				Decrease sand content.			2135	
	715								
	720				SAA			0000	08/12/13
	725								
	730				SAA			0020	
	735								
	740				SAA			0045	
	745								
	750				SAA			0134	
	755								
	760				Becomes grayish brown (10YR 5/2).			0330	
	765								
	770				SAA			0340	08/12/13
	775								
	780				SAA			0440	
	785								
	790				SAA			0520	
	795								
	800								

Project: City of Torrance - Department of Public Works
Project Location: La Carretera Park
Project Number: 29869072

Log of Boring Pilot Boring #13

Sheet 8 of 9

Elevation, feet MSL	Depth, feet	SAMPLES Type	SAMPLES Sample Time	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	800				SAA			0600	
	805								
	810				SAA			0650	
	815								
	820				SAA			0830	
	825								
	830				SAA			1020	
	835								
	840				SAA			1103	
	845								
	850				SAA			1210	
	855								
	860				SAA			1331	
	865								
	870				SAA			1440	
	875								
	880				SAA			1540	
	885								
	890				SAA			1640	
	895								
	900				SAA			1740	08/12/13
	905								
	910				SAA			1830	
	915								

Project: City of Torrance - Department of Public Works
Project Location: La Carretera Park
Project Number: 29869072

Log of Boring Pilot Boring #13

Sheet 9 of 9

Elevation, feet MSL	Depth, feet	SAMPLES Type	SAMPLES Sample Time	SAMPLES	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	920					Total Depth: 920 Ft bgs.				
	925									
	930									
	935									
	940									
	945									
	950									
	955									
	960									
	965									
	970									
	975									
	980									
	985									
	990									
	995									
	1000									
	1005									
	1010									
	1015									
	1020									
	1025									
	1030									

ATTACHMENT B

Geophysical Log by Pacific Surveys, Inc.

PACIFIC SURVEYS

LATEROLOG 3
GAMMA RAY

Job No. 17579	Company	SOUTH WEST PUMP & DRILLING
	Well	WELL #13
	Field	TORRANCE
File No.	County	LOS ANGELES State CA

Location:

2040 186th STREET
GPS:N 33o51.713' W118o18.915'

Sec. Twp. Rge.

Other Services:
ELOG
SNC/VDL

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

Date	08/12/2013		
Run Number	ONE		
Depth Driller	920'		
Depth Logger	920'		
Bottom Logged Interval	920'		
Top Log Interval	0'		
Casing Driller	36" @ 50'		
Casing Logger	50'		
Bit Size	17.5"		
Type Fluid in Hole	WATER		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	TANK		
Rm @ Meas. Temp	8.77 @ 77F		
Rmf @ Meas. Temp	8.77 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEASURE		
Rm @ BHT	N/A		
Time Circulation Stopped	3 HOURS		
Time Logger on Bottom	11:30 PM		
Max. Recorded Temperature	N/A		
Equipment Number	PS-5		
Location	L.A.		
Recorded By	ABREAU		
Witnessed By	J. SANKS		

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Comments

Calibration Report

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Dataset Pathname	LL3
Dataset Creation	Tue Aug 13 00:08:27 2013

Gamma Ray Calibration Report

Serial Number:	12	
Tool Model:	GROH	
Performed:	Wed Jan 02 12:20:51 2013	
Calibrator Value:	162.0	GAPI
Background Reading:	54.1	
Calibrator Reading:	193.3	
Sensitivity:	1.1641	GAPI/

RLL3 (Resistivity Laterolog 3) Calibration Report:

Serial Number:	130
Tool Model:	M&W
Performed:	Wed Jan 02 14:38:35 2013

System Reading	Calibration Reference	
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0.007	5.000	
0.068	50.000	
0.358	250.000	
0.707	500.000	

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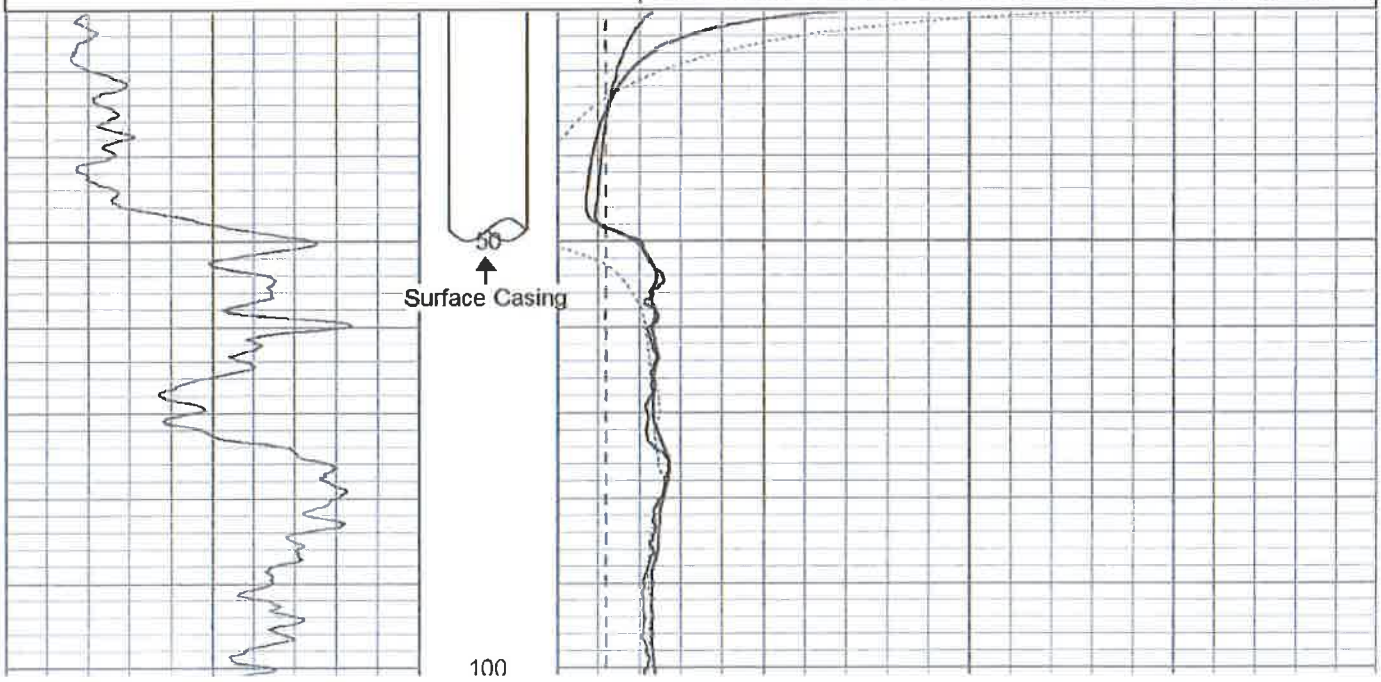
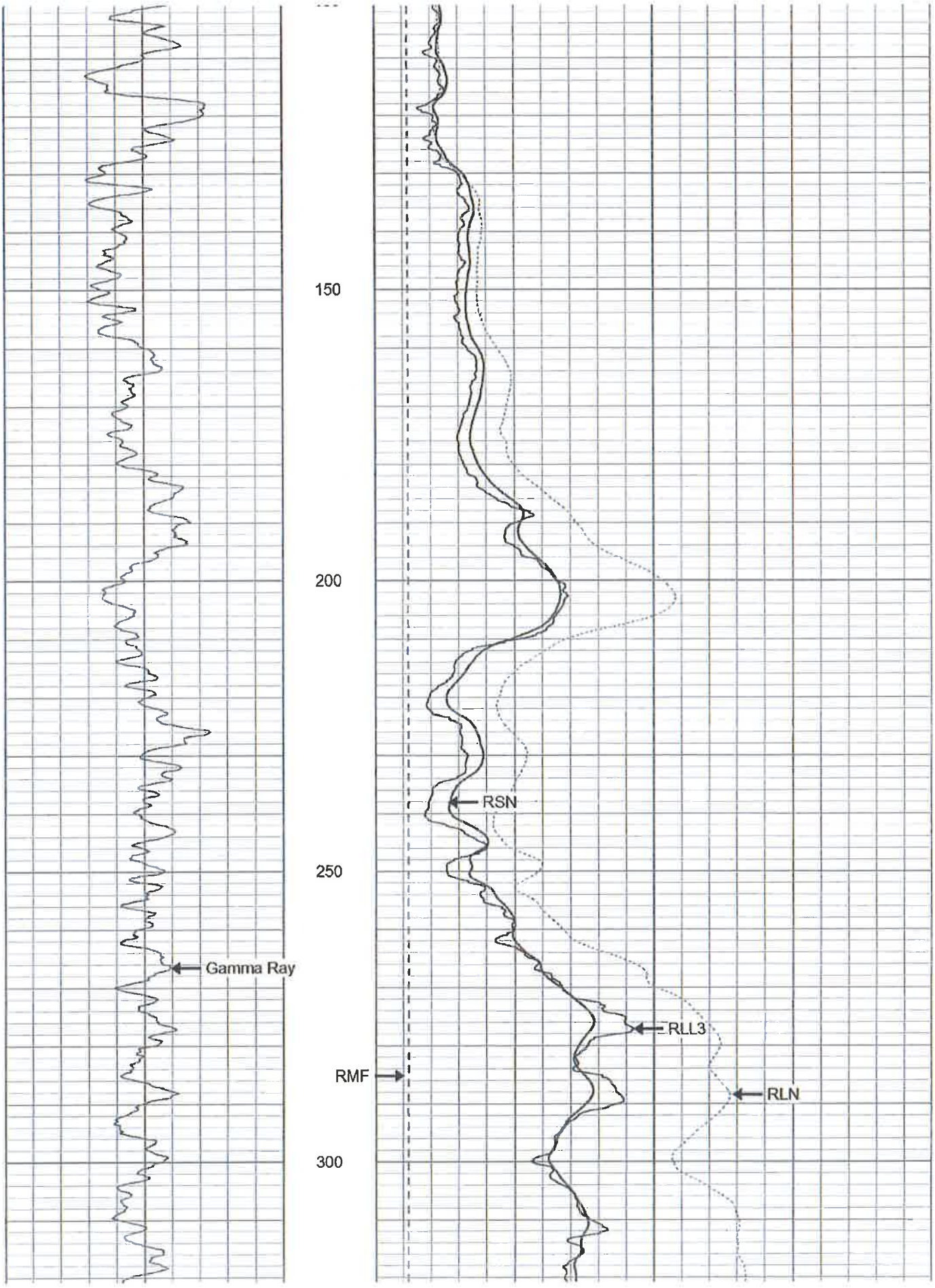
Dataset Creation	Tue Aug 13 00:08:27 2013
Charted by	Depth in Feet scaled 1:240

40	Gamma Ray (GAPI)	90

0	RSN (Ohm-m)	150
0	RLN (Ohm-m)	150
0	RMF (Ohm-m)	150
0	RLL3 (Ohm-m)	150
150	RLL3 x 10 (Ohm-m)	1500
150	RSN x 10 (Ohm-m)	1500
150	RLN x 10 (Ohm-m)	1500

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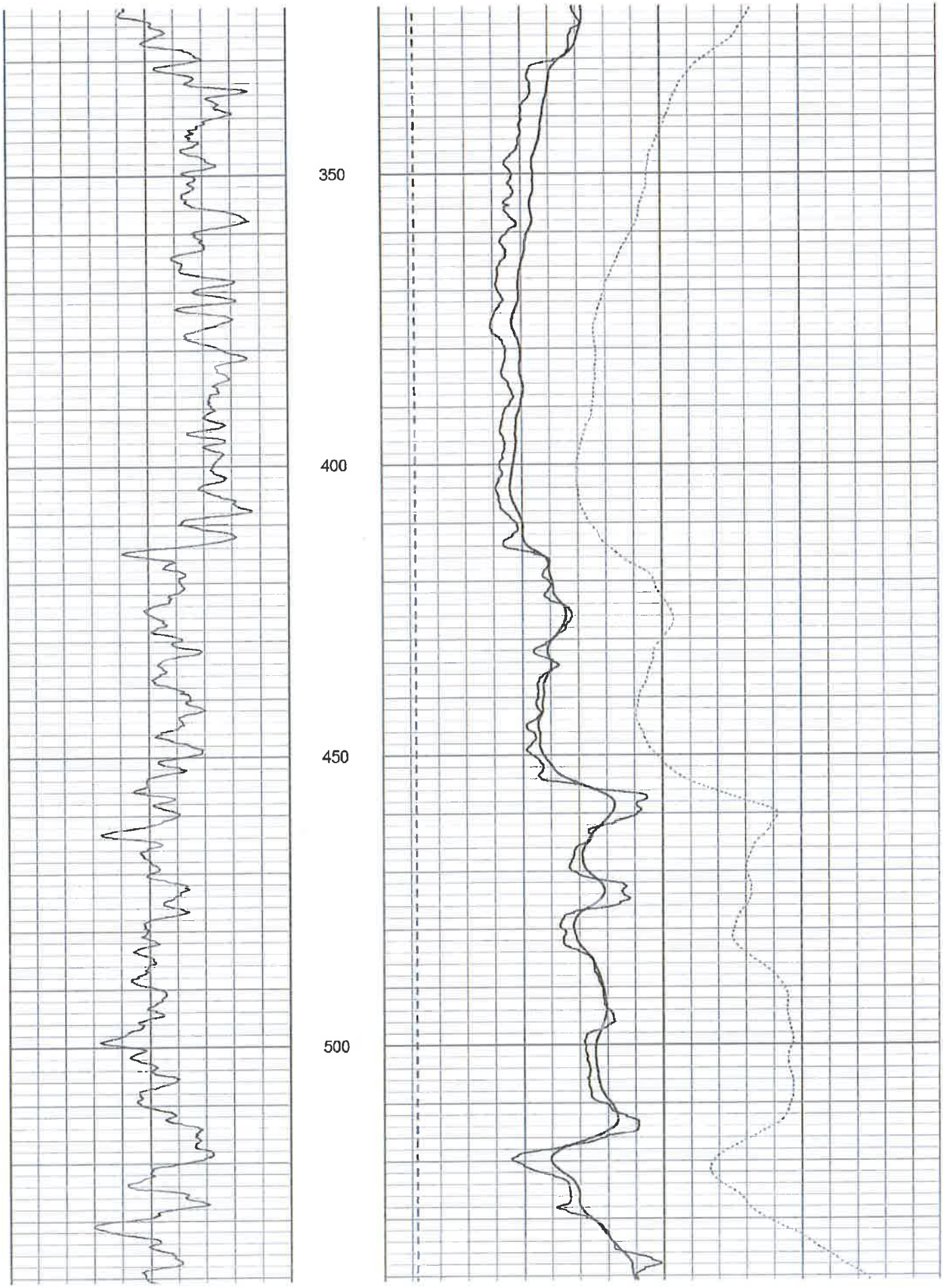
RMF
RLN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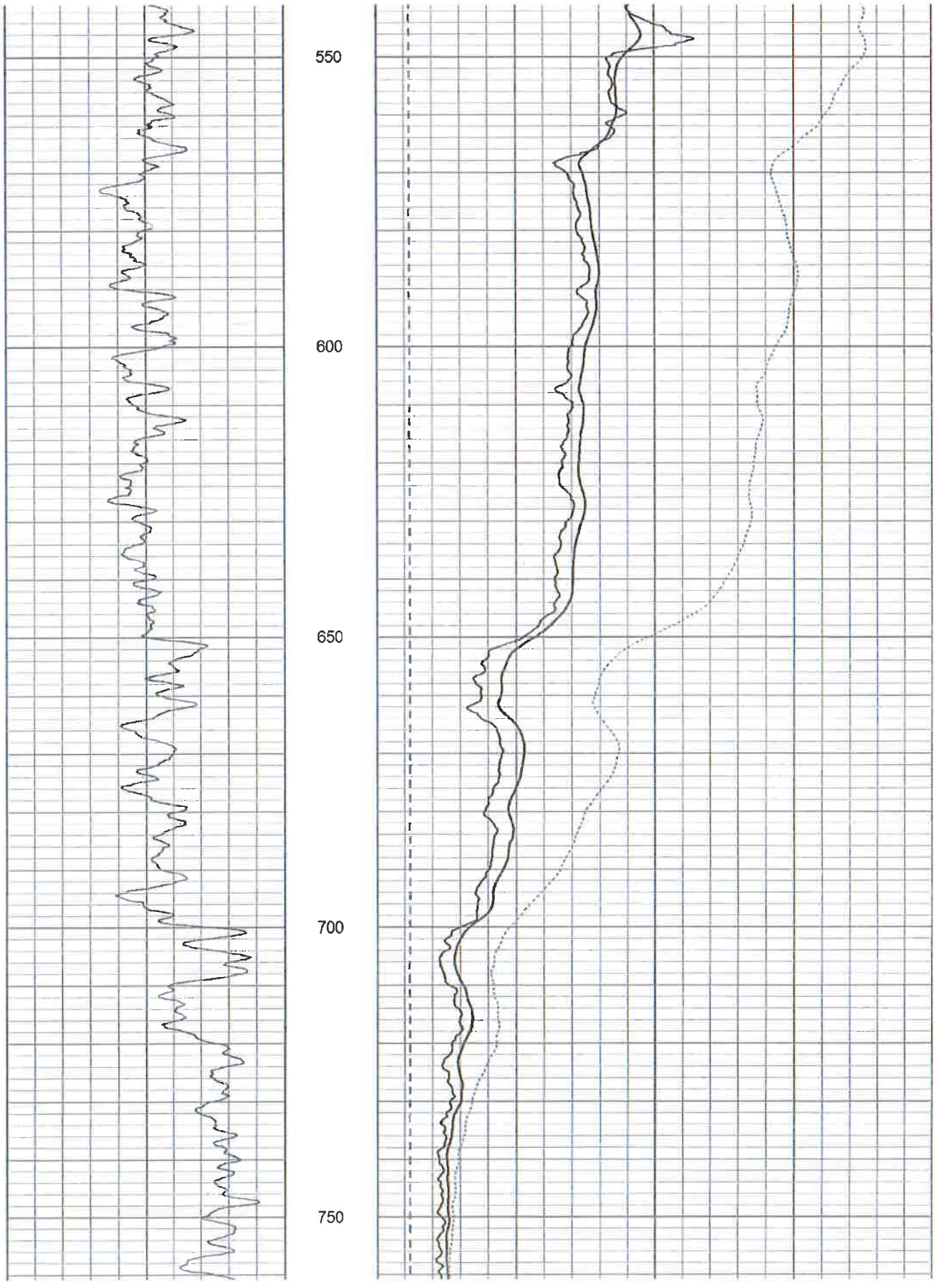
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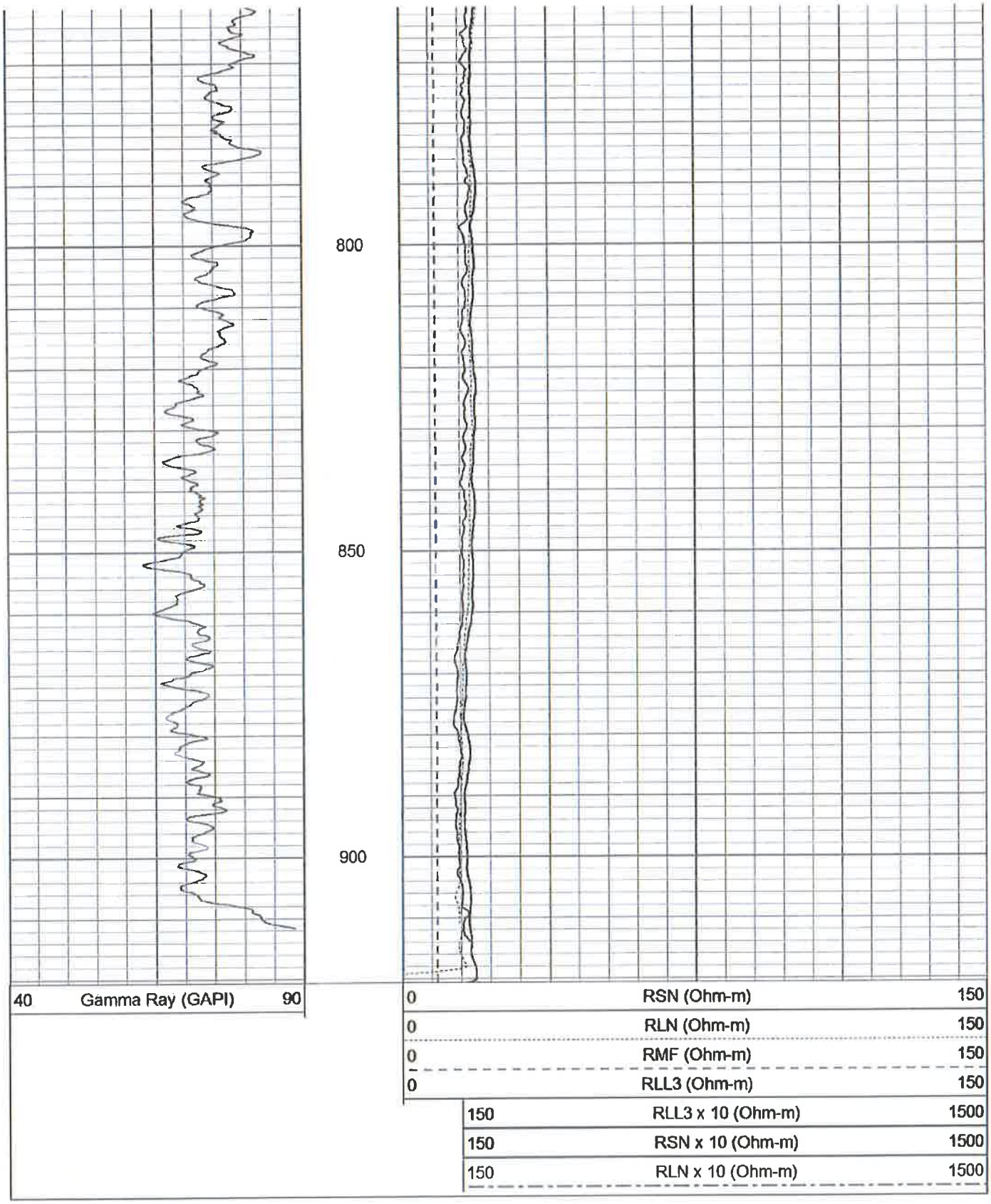
800
850
900
40 Gamma Ray (GAPI) 90
0 RSN (Ohm-m) 150
0 RLN (Ohm-m) 150
0 RMF (Ohm-m) 150
0 RLL3 (Ohm-m) 150
150 RLL3 x 10 (Ohm-m) 1500
150 RSN x 10 (Ohm-m) 1500
150 RLN x 10 (Ohm-m) 1500

PACIFIC SURVEYS

SONIC VELOCITY VARIABLE DENSITY

Job No. 17579

File No.

Company SOUTH WEST PUMP & DRILLING

Well WELL #13

Field TORRANCE

County LOS ANGELES State CA

Location:

2040 186th STREET
GPS:N 33o51.713' W118o18.915'

Other Services:

ELOG
GR/LL3

Sec. Twp. Rge.

Permanent Datum	G.L.		Elevation above perm. datum	K.B.	Elevation
Log Measured From	G.L.	0'		D.F.	
Drilling Measured From	G.L.			G.L.	
Date		08/12/2013			
Run Number		ONE			
Depth Driller		920'			
Depth Logger		920'			
Bottom Logged Interval		920'			
Top Log Interval		0'			
Casing Driller		36" @ 50'			
Casing Logger		50'			
Bit Size		17.5"			
Type Fluid in Hole		WATER			
Density / Viscosity		N/A			
pH / Fluid Loss		N/A			
Source of Sample		TANK			
Rm @ Meas. Temp		8.77 @ 77F			
Rmf @ Meas. Temp		8.77 @ 77F			
Rmc @ Meas. Temp		N/A			
Source of Rmf / Rmc		MEASURE			
Rm @ BHT		N/A			
Time Circulation Stopped		3 HOURS			
Time Logger on Bottom		11:30 PM			
Max. Recorded Temperature		N/A			
Equipment Number		PS-5			
Location		LA			
Recorded By		ABREAU			
Witnessed By		J. SANKS			

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Comments

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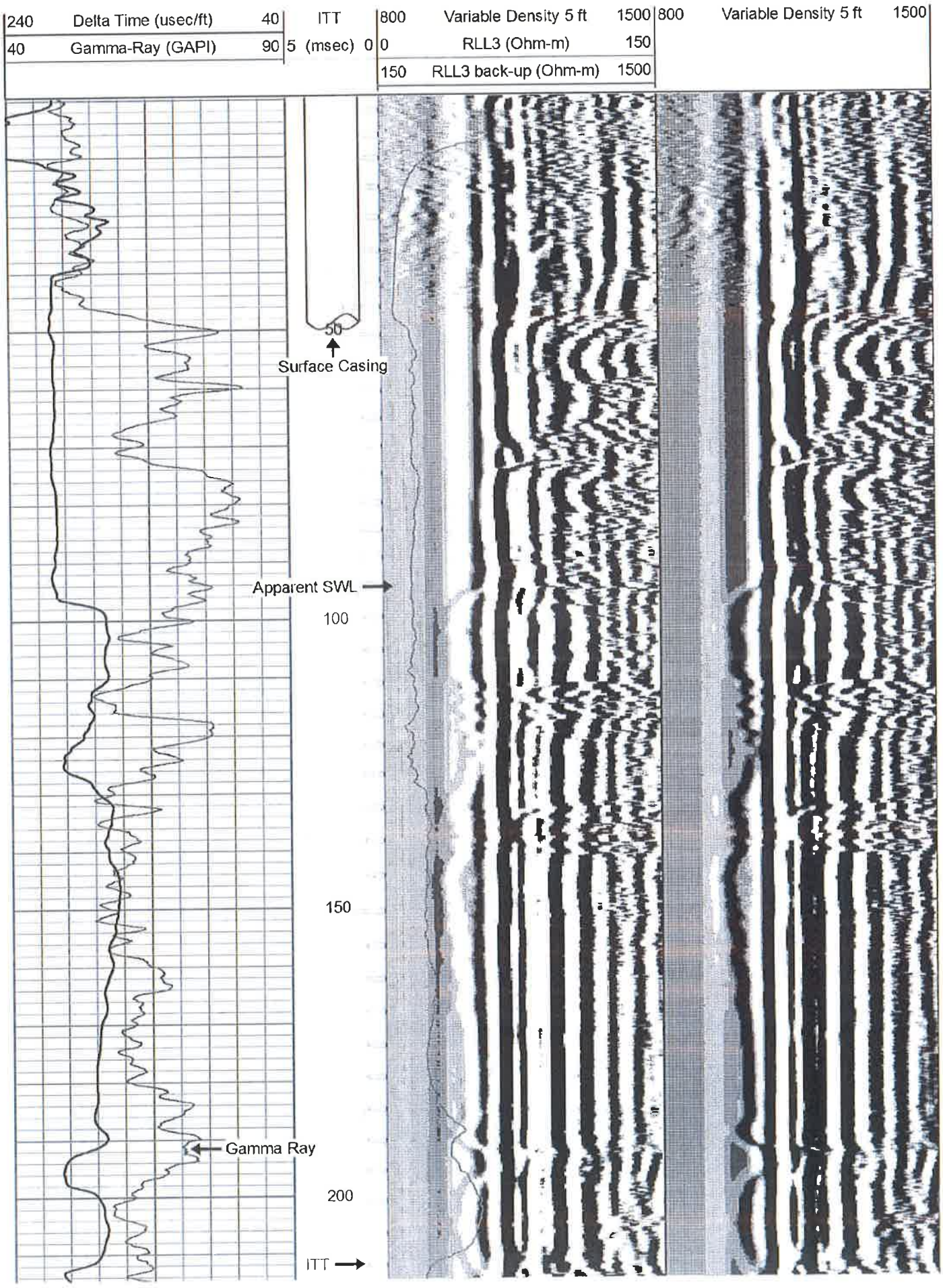
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800 Variable Density 5 ft 1500
0 RLL3 (Ohm-m) 150
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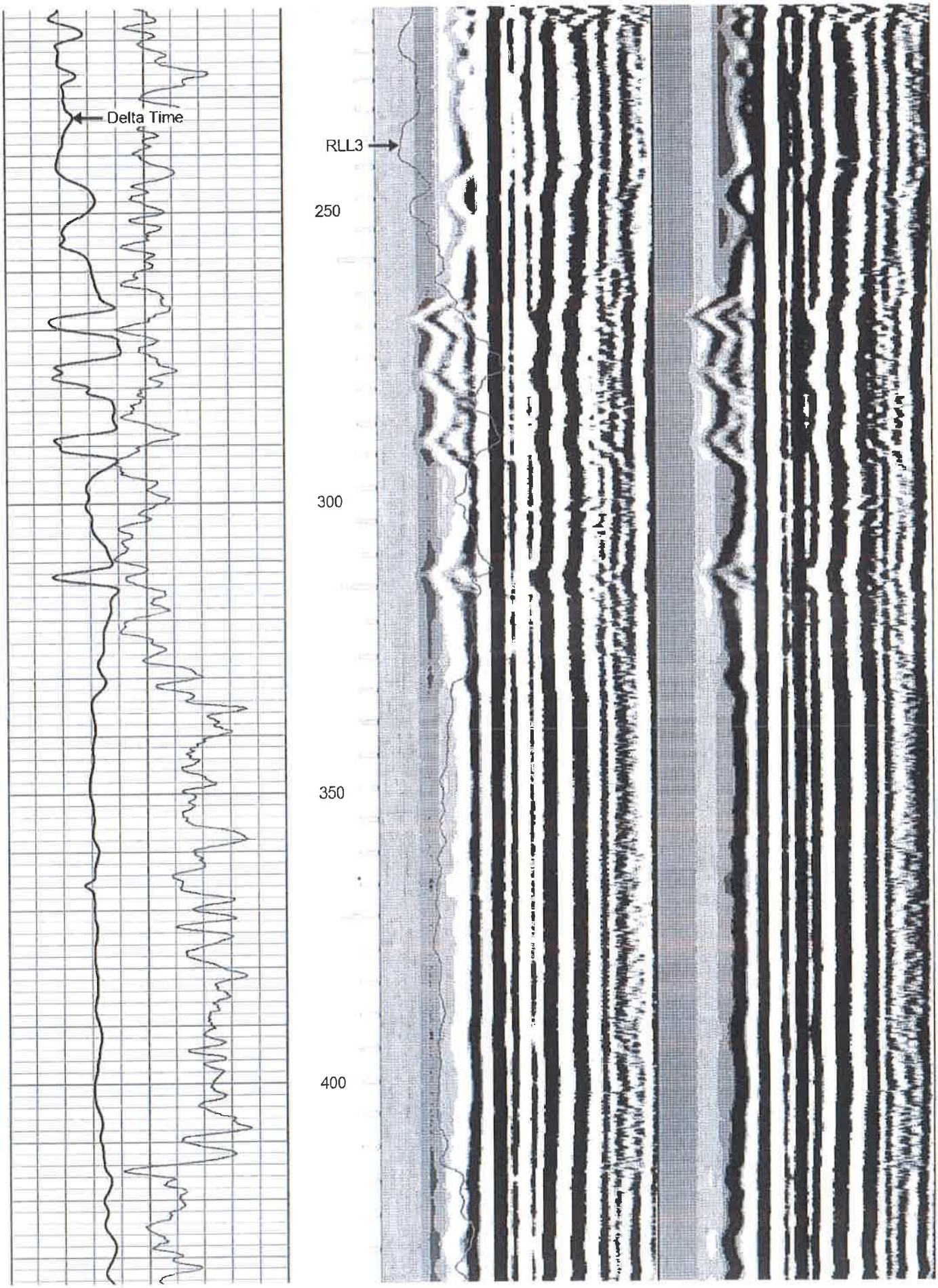
800 Variable Density 5 ft 1500
50
Surface Casing
Apparent SWL
100
150
Gamma Ray
200
ITT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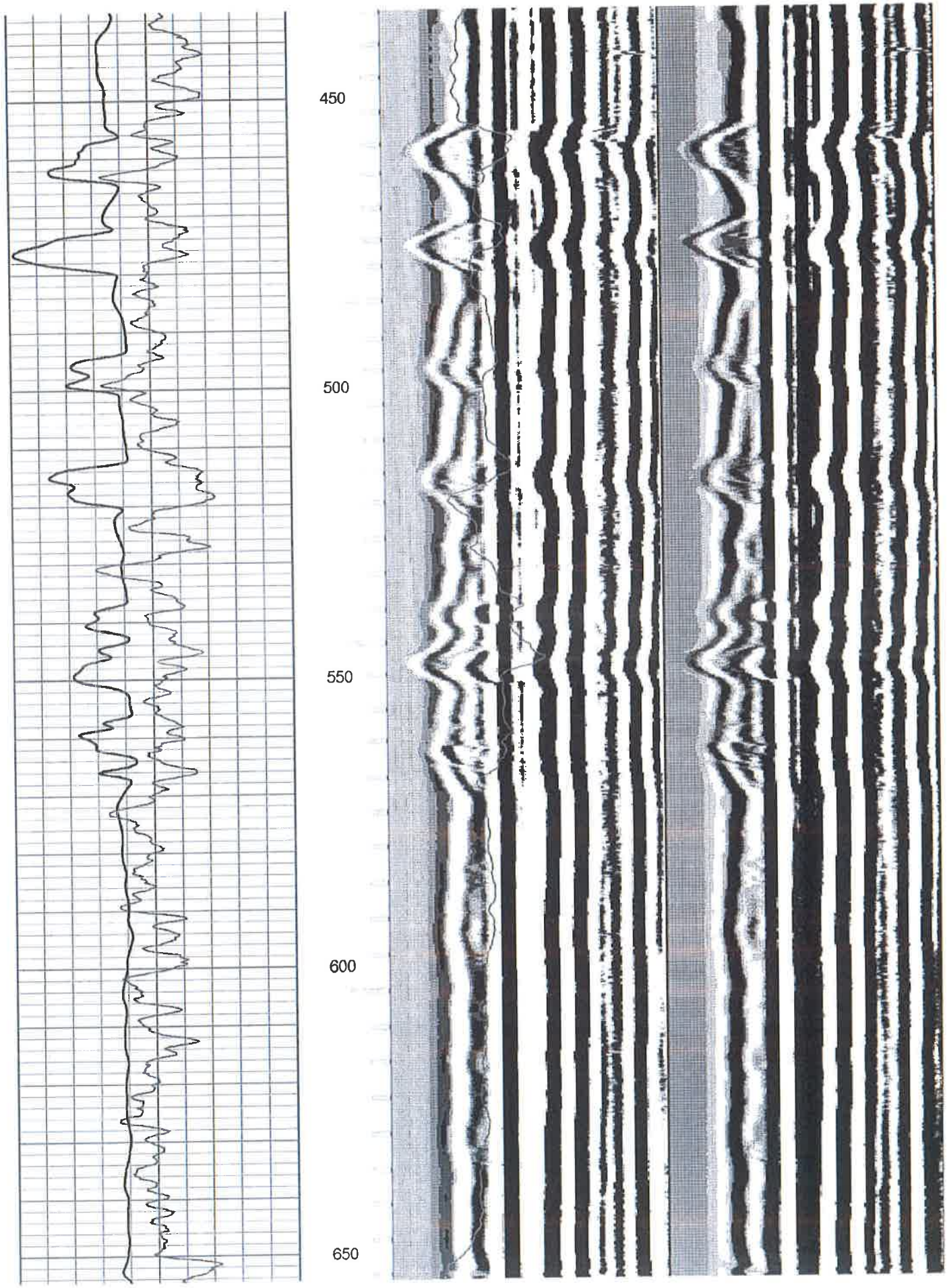
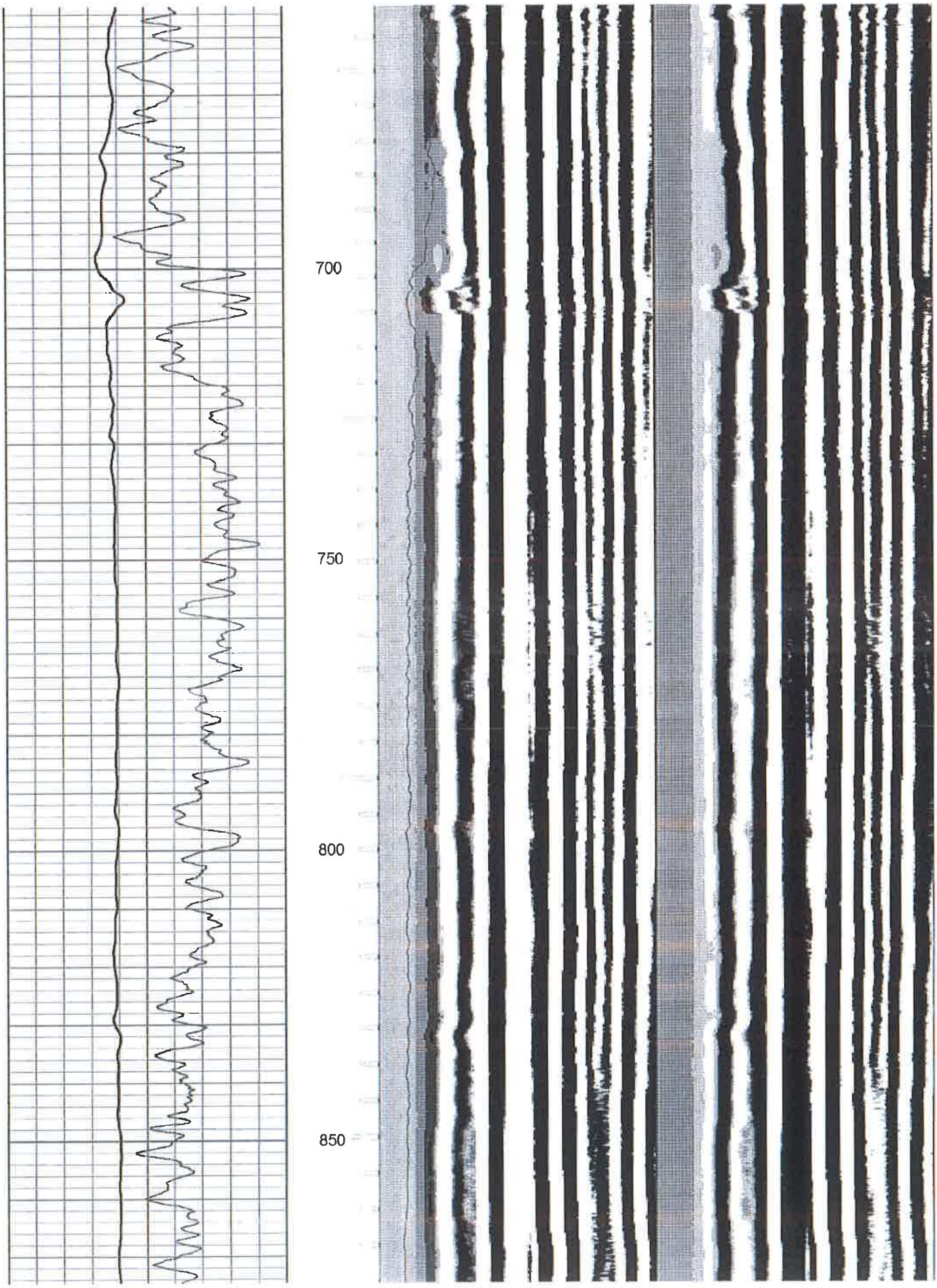
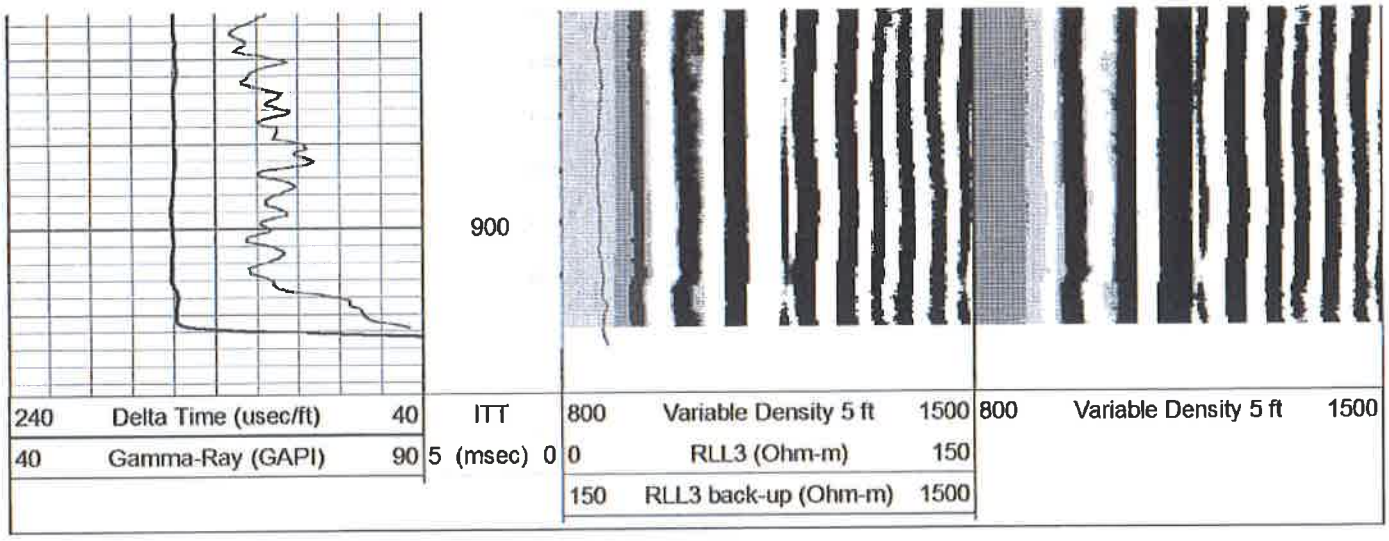
RLL3
250
300
350
400


450
500
550
600
650


700
750
800
850


900
240 Delta Time (usec/ft) 40
40 Gamma-Ray (GAPI) 90
ITT
5 (msec) 0
800 Variable Density 5 ft 1500
0 RLL3 (Ohm-m) 150
150 RLL3 back-up (Ohm-m) 1500
800 Variable Density 5 ft 1500

PACIFIC SURVEYS

ELECTRIC LOG
LATEROLOG 3
GAMMA RAY

Job No. 17579

File No.

Company SOUTH WEST PUMP & DRILLING

Well WELL #13

Field TORRANCE

County LOS ANGELES State CA

Location:

2040 186th STREET
GPS:N 33o51.713' W118o18.915'

Other Services:

GR/LL3
SNC/VDL

Sec. Twp. Rge.

Permanent Datum	G.L.	0'	Elevation above perm. datum	Elevation K.B. D.F. G.L.
Log Measured From	G.L.			
Drilling Measured From	G.L.			
Date		08/12/2013		
Run Number		ONE		
Depth Driller		920'		
Depth Logger		920'		
Bottom Logged Interval		920'		
Top Log Interval		0'		
Casing Driller		**36" @ 50'**		
Casing Logger		50'		
Bit Size		17.5"		
Type Fluid in Hole		WATER		
Density / Viscosity		N/A		
pH / Fluid Loss		N/A		
Source of Sample		TANK		
Rm @ Meas. Temp		8.77 @ 77F		
Rmf @ Meas. Temp		8.77 @ 77F		
Rmc @ Meas. Temp		N/A		
Source of Rmf / Rmc		MEASURE		
Rm @ BHT		N/A		
Time Circulation Stopped		3 HOURS		
Time Logger on Bottom		11:30 PM		
Max. Recorded Temperature		N/A		
Equipment Number		PS-5		
Location		LA		
Recorded By		ABREAU		
Witnessed By		J. SANKS		

<<< Fold Here >>>

Comments

Calibration Report

Database File	17579.db
Dataset Pathname	elog
Dataset Creation	Mon Aug 12 23:29:23 2013

ELOG Calibration Report

Serial:	D1
Model:	DTQ
Shop Calibration Performed:	Wed Jan 02 13:42:42 2013
Before Survey Verification Performed:	Fri Aug 31 10:09:27 2012
After Survey Verification Performed:	Fri Aug 31 10:11:46 2012

Shop Calibration

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	9.343	101.133		10.200	102.200	Ohm-m	1.002	0.836
Long	7.393	96.345		10.200	102.200	Ohm-m	1.034	-17.600
IEE	209.320	7096.560	counts	0.229	7.766	A		
VSN	96.180	8069.260	counts	1.835	153.911	V		
VLN	86.040	2050.920	counts	1.641	39.119	V		

Before Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	28.684	101.321		34.937	101.312	Ohm-m	0.914	8.726
Long	153.931	102.826		102.828	102.828	Ohm-m	0.659	35.059
IEE	245.260	7584.340	counts	0.268	8.300	A		
VSN	79.040	8633.620	counts	1.508	164.676	V		
VLN	106.040	2190.460	counts	2.023	41.780	V		

After Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	28.273	101.325		28.684	101.321	Ohm-m	0.994	0.572
Long	152.477	102.843		102.826	102.826	Ohm-m	1.030	-3.065
IEE	249.140	7584.080	counts	0.273	8.300	A		
VSN	79.140	8633.680	counts	1.509	164.677	V		
VLN	106.700	2190.760	counts	2.035	41.786	V		

After Survey Verification compared to Before Survey Calibration

	Zero			Cal		
	Before	After		Before	After	
Short	34.937	28.684	Ohm-m	101.312	101.321	Ohm-m
Long	136.510	153.931	Ohm-m	102.828	102.826	Ohm-m

Gamma Ray Calibration Report

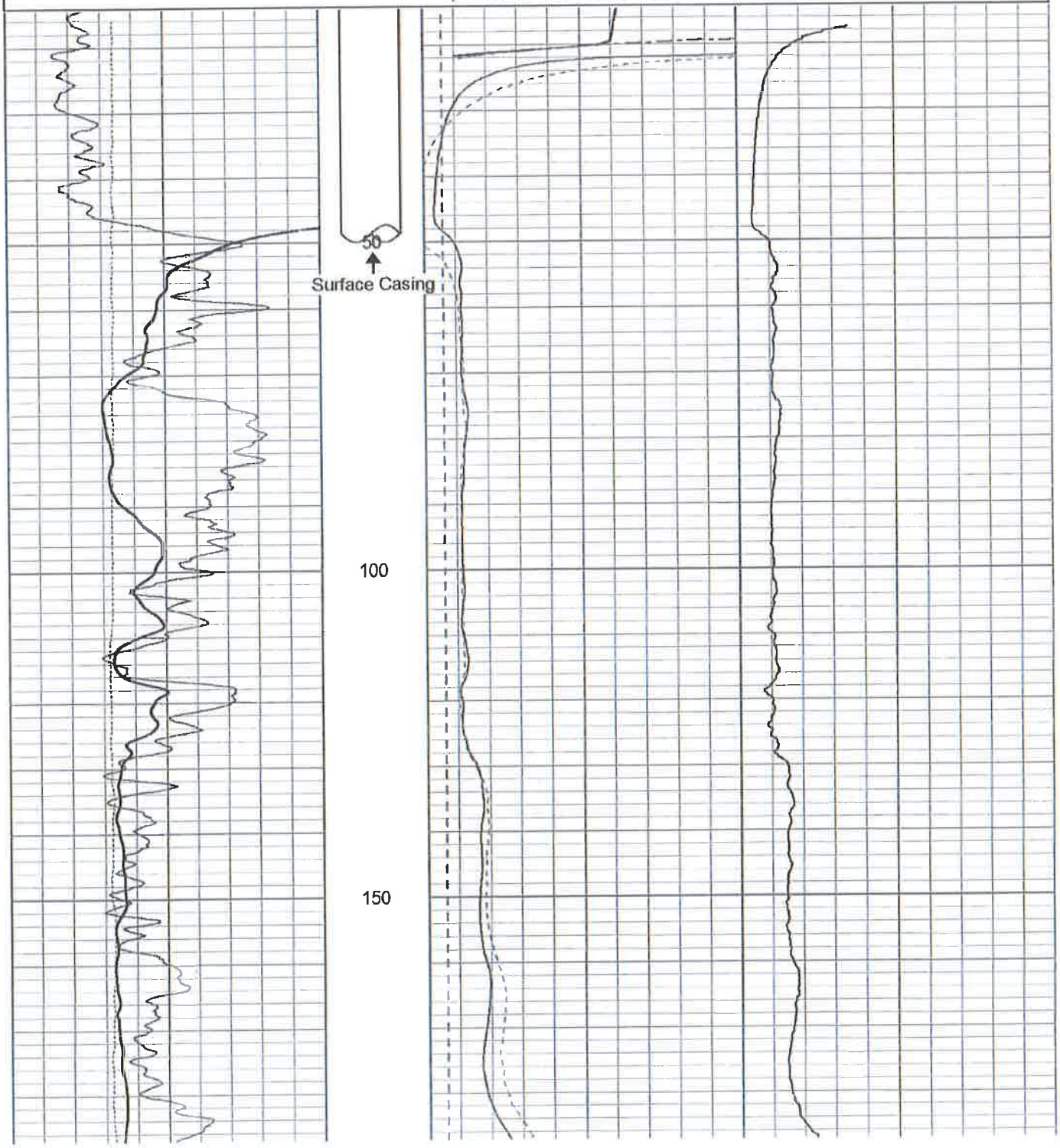
Serial Number:	D4	
Tool Model:	ELOG	
Performed:	Wed Jan 02 16:00:53 2013	
Calibrator Value:	162.0	GAPI
Background Reading:	212.4	cps
Calibrator Reading:	707.5	cps
Sensitivity:	0.3272	GAPI/cps

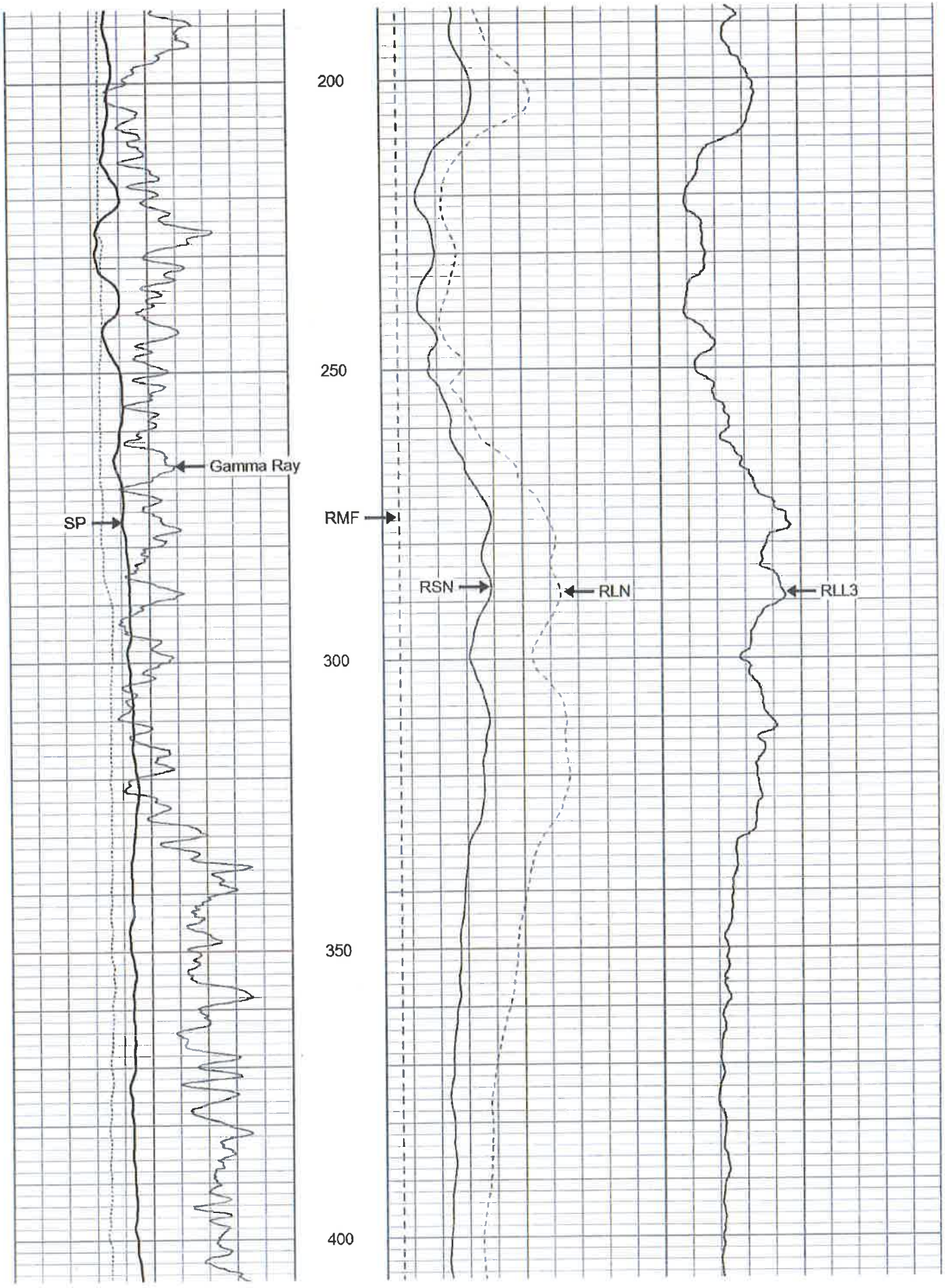
Database File	17579.db
Dataset Pathname	elog
Presentation Format	elog
Dataset Creation	Mon Aug 12 23:29:23 2013
Charted by	Depth in Feet scaled 1:240

-20	SP (mV)	80
0	Line Speed (ft/min)	-100
40	Gamma Ray (GAPI)	90

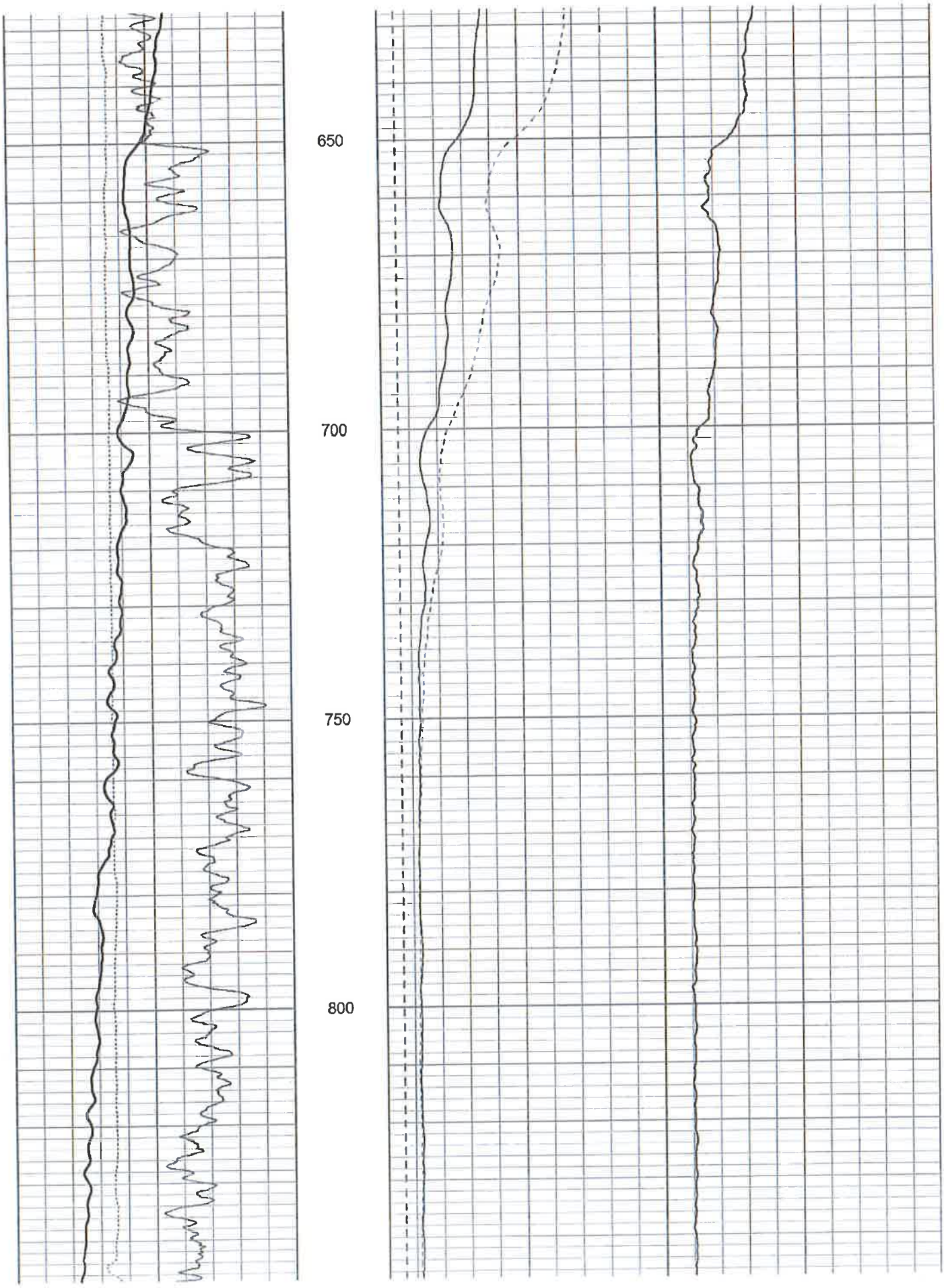
0	RSN (Ohm-m)	150
0	RLN (Ohm-m)	150
0	RMF (Ohm-m)	150
150	RSN x 10 (Ohm-m)	1500
150	RLN x 10 (Ohm-m)	1500

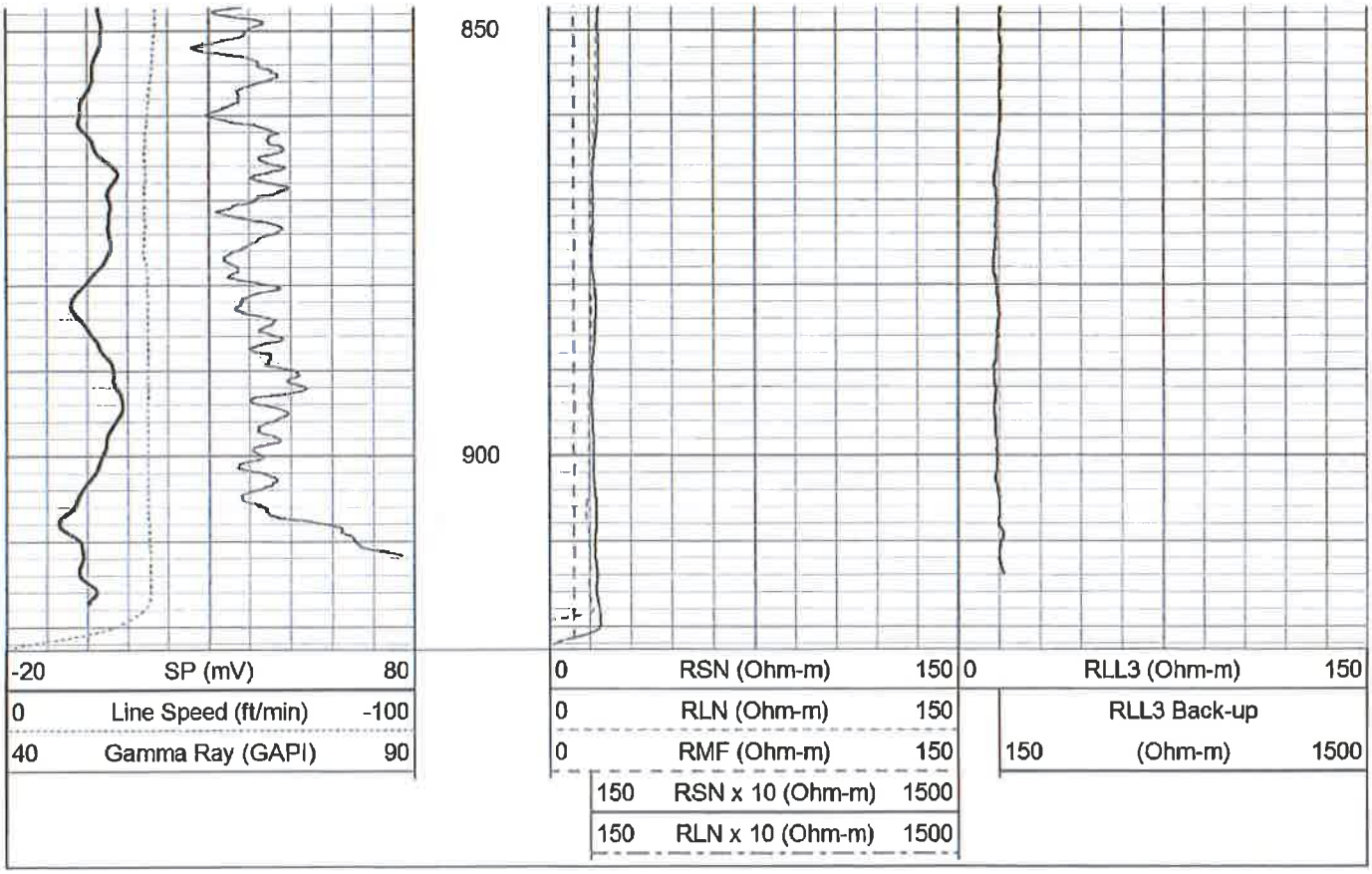
0	RLL3 (Ohm-m)	150
	RLL3 Back-up	
150	(Ohm-m)	1500




200
250
300
350
400
Gamma Ray
SP
RMF
RSN
RLN
RLL3


450
500
550
600

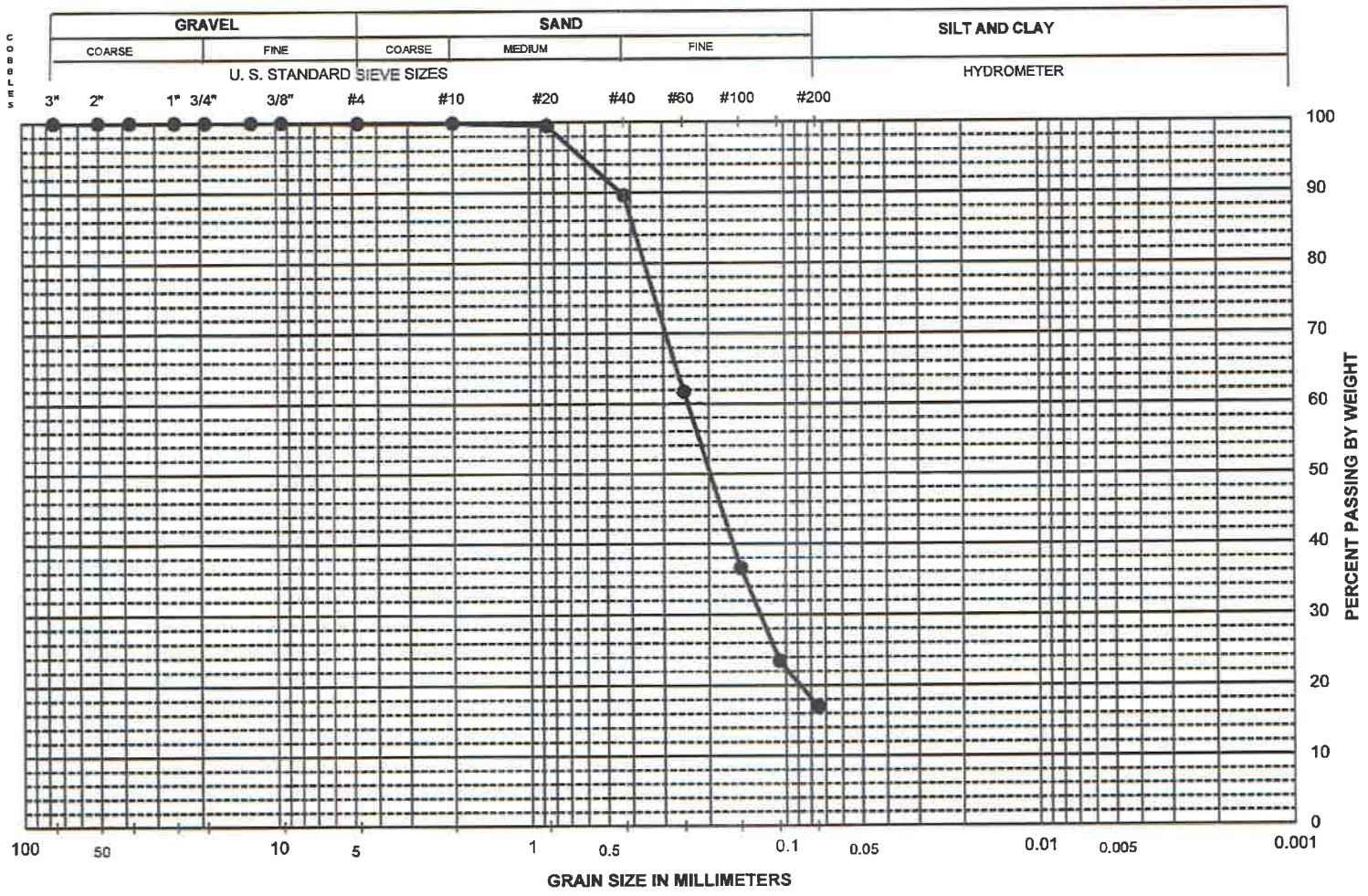

650
700
750
800


850
900
-20 SP (mV) 80
0 Line Speed (ft/min) -100
40 Gamma Ray (GAPI) 90
0 RSN (Ohm-m) 150
0 RLN (Ohm-m) 150
0 RMF (Ohm-m) 150
150 RSN x 10 (Ohm-m) 1500
150 RLN x 10 (Ohm-m) 1500
0 RLL3 (Ohm-m) 150
RLL3 Back-up
150 (Ohm-m) 1500

ATTACHMENT C

Sieve Analysis Performed by URS

UNIFIED SOIL CLASSIFICATION



Sieve No.	Dia. mm	% Finer
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.00	100.0
1/2"	12.50	100.0
3/8"	9.50	100.0
#4	4.75	99.9
#10	2.00	99.9
#20	0.850	99.5
#40	0.425	89.6
#60	0.250	61.7
#100	0.150	36.6
#140	0.106	23.5
#200	0.075	17.0
Hydrometer Analysis		

% Cobbles	—
% Gravel	0.1
% Sand	82.9
% Fines	17.0
D_{85}	0.389
D_{60}	0.241
D_{50}	0.197
D_{30}	0.126
D_{15}	—
D_{10}	—
C_u	—
C_c	—

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 μm	Description and Classification
Well 13		190 ~ 200	•	—	—	—	—	Gray silty Sand (SM)

PROJECT NAME: City of Torrance

PROJECT NUMBER: 29869072.00005

PARTICLE-SIZE DISTRIBUTION CURVES

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0190

URS

GRADATION OF SOILS by Sieving using Soil Sieve Sizes & with Water Content
ASTM D422, ASTM D6913 and D2216

Project Number: _____ Task Number: _____ Boring No.: Well 13

Project Name: City of Torrance Sample No.: _____

Project Engineer: BP Depth (ft): 190 ~ 200

Visual Description: Gray silty Sand (SM)

SPECIMEN: Selected From:

Bulk Sample	x		Other - Jar
SPT Sample			Thin-Walled Tube
Calif. Sample			Engr. Test Specimen's WC

Whole sample used

See Bulk Sample Processing Form

Selection Method(s) & Sieve Range:

_____ Sieves (1) - whole sample used

x Sieves (1) - partial sample used & selected by Method(s)

c Selection Method

(a): Splitter; (use for dry soils or that which will segregate)

(b): Quartering; (use for dry soils or that which will segregate)

(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

Preparation: Sample/Specimen:

As-Received	x
Air Dried	
Oven-Dried	

Test Method (D6913)

Method A	
Method B	x

Oven-Dried Soil Broken Up Before:

Selecting partial sample: No x, Yes

By: Mortar & Pestle, Hand, Pulverizer, Other

Washing:

	No	Yes
Whole Specimen Washed on No. 200 sieve ?		x
Retained Fraction: 1st Split Washed ?		
Fine Fraction Washed on No. 200 sieve ?		

and Soil Soaked for: 6 hrs.

MASS OF TEST SPECIMEN (g)	Total Test Specimen with Coarse Fraction	Partial or Whole Test Specimen	Soil Retained (after washing)	Water Content: As Recieved or Container No.	
Min.sieve size in sieving sequence (3)	#N/A	# 200	+200	Wet, M1 (g)	
Container Number		x3	x3	Dry, M2 (g)	XXX
Mass of Container and Dry Soil, (g)		679.78	590.8	Cont.,M3 (g)	XXX
Mass of Container, (g)		138.02	138.1	Water Content (%)	NA
Dry Soil, Ws (g)		541.76	452.7		

% error: 0.11

SIEVING RESULTS

See (1)	Sieve No.	Cum. Mass Retained (g)	Total Specimen % Finer N'
	3 "		
	2 "		
	1 1/2"		
	1 "		
	3/4 "		
	1/2 "		
	3/8 "		
	4		
	Pan		XXXXXXXX

Req. Mass of Test Spec. for 1% (kg)
3"= 70
1 1/2"=10
3/4"= 1.1
3/8"= 0.25
#4 = 0.1
#10 = 0.1

Shape of Grains

	Rounded
	Angular
	Flat

See (4)	See (2)	(2) Proposed allowable amount of soil retained on 8" dia. sieve.	(3) Sieve No.	Cum. Mass Retained (g)	Partial Test Specimen	Total Specimen % Finer N'
			3 "			
			2 "			
			1-1/2"			
			1 "			
			3/4 "			
			1/2 "			
			3/8 "	0		100
		325	#4	0.4		99.9
		180	#10	0.8		99.9
		115	#20	2.8		99.5
		75	#40	56.3		89.6
		60	#60	207.5		61.7
		40	#100	343.6		36.6
		30	#140*	414.5		23.5
		20	#200	449.5		17
			Pan	452.2	XXXXXXXX	XXXXXXXXX

SUMMARY: Shape & Filter Parameters

% COBBLES	---	D60	0.241	D85	0.39
% GRAVEL	0.1	D30	0.126	D50	0.20
% SAND	82.9	D10	---	D15	---
% FINES	17.0	Cu =	---	Cc =	---

* Denotes sieve added to better define gradation curve

$Cu = D_{60} / D_{10}$

(1) X in box denotes sieve on which split was made. $Cc = D_{30}^2 / (D_{60} * D_{10})$

(2) Proposed allowable amount of soil retained on 8" dia. Sieve.

(3) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.

(4) ** denotes multiple sieve iterations to avoid overloading.

Mica Noted: x No ____ Yes Amount Adjective: _____

Particle Hardness

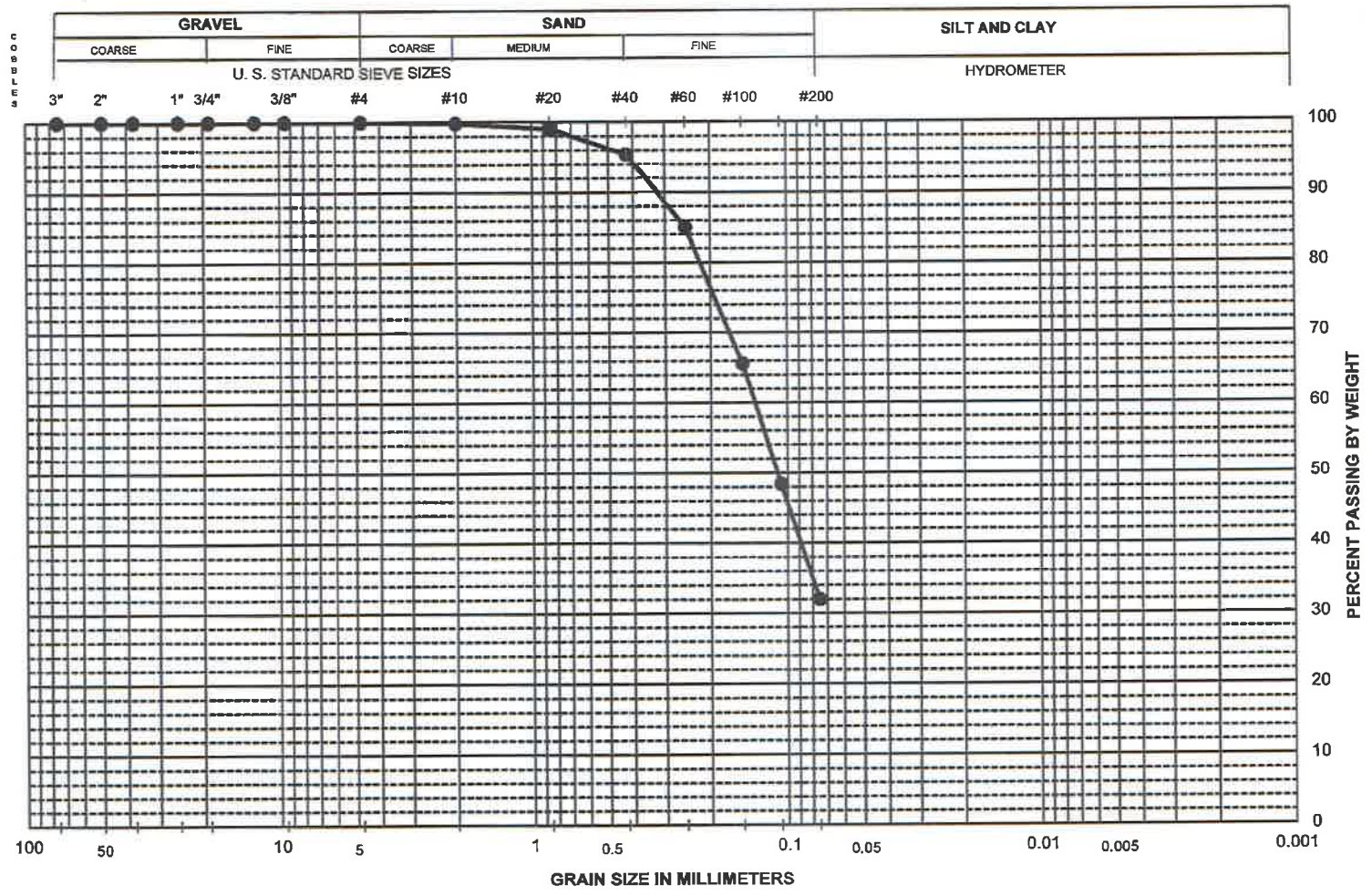
____ Hard ____ Soft ____ Weathered

CALCULATED BY: LV

SET-UP BY: TJO DATE 09/09/13 CHECKED BY: TJO SUBMITTED BY: _____

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0190 URS

UNIFIED SOIL CLASSIFICATION



Sieve No.	Dia. mm	% Finer
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.00	100.0
1/2"	12.50	100.0
3/8"	9.50	100.0
#4	4.75	100.0
#10	2.00	99.8
#20	0.850	99.0
#40	0.425	95.4
#60	0.250	85.0
#100	0.150	65.6
#140	0.106	48.4
#200	0.075	32.0
Hydrometer Analysis		

% Cobbles	—
% Gravel	0.0
% Sand	68.0
% Fines	32.0
D_{85}	0.250
D_{60}	0.134
D_{50}	0.109
D_{30}	—
D_{15}	—
D_{10}	—
C_u	—
C_c	—

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 μm	Description and Classification
Well 13		310 ~ 320	•	—	—	—	—	Gray silty Sand (SM)

PROJECT NAME: City of Torrance
PROJECT NUMBER: 29869072.00005

PARTICLE-SIZE DISTRIBUTION CURVES

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0310

URS

GRADATION OF SOILS by Sieving using Soil Sieve Sizes & with Water Content

ASTM D422, ASTM D6913 and D2216

Project Number: _____ Task Number: _____ Boring No.: Well 13

Project Name: City of Torrance Sample No.: _____

Project Engineer: BP Depth (ft): 310 ~ 320

Visual Description: Gray silty Sand (SM)

SPECIMEN: Selected From:

Bulk Sample	x		Other - Jar
SPT Sample			Thin-Walled Tube
Calif. Sample			Engr. Test Specimen's WC

[ ] Whole sample used

[ ] See Bulk Sample Processing Form

Selection Method(s) & Sieve Range:

_____ Sieves (1) - whole sample used

x Sieves (1) - partial sample used & selected by Method(s)

c Selection Method

(a): Splitter; (use for dry soils or that which will segregate)

(b): Quartering; (use for dry soils or that which will segregate)

(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

Preparation: Sample/Specimen:

As-Received	x
Air Dried	
Oven-Dried	

Test Method (D6913)

Method A	
Method B	x

Oven-Dried Soil Broken Up Before:

Selecting partial sample: No x, Yes

By: [ ] Mortar & Pestle [ ] Hand [ ] Pulverizer [ ] Other

Washing:

	No	Yes
Whole Specimen Washed on No. 200 sieve ?		x
Retained Fraction: 1st Split Washed ?		
Fine Fraction Washed on No. 200 sieve ?		

and Soil Soaked for: 6 hrs.

MASS OF TEST SPECIMEN (g)	Total Test Specimen with Coarse Fraction	Partial or Whole Test Specimen	Soil Retained (after washing)	Water Content: As Recieved or Container No.	
Min.sieve size in sieving sequence (3)	#N/A	# 200	+200	Wet, M1 (g)	
Container Number		x27	x27	Dry, M2 (g)	XXX
Mass of Container and Dry Soil, (g)		476.9	381.7	Cont.,M3 (g)	XXX
Mass of Container, (g)		153.87	153.9	Water Content (%)	NA
Dry Soil, Ws (g)		323.03	227.8		

% error: 0.04

SIEVING RESULTS

See (1)	Sieve No.	Cum. Mass Retained (g)	Total Specimen % Finer N'
	3 "		
	2 "		
	1 1/2"		
	1 "		
	3/4 "		
	1/2 "		
	3/8 "		
	4		
	Pan		XXXXXXXX

Req. Mass of Test Spec. for 1% (kg)
3"= 70
1 1/2"=10
3/4"= 1.1
3/8"= 0.25
#4 = 0.1
#10 = 0.1

Shape of Grains

[ ] Rounded

[ ] Angular

[ ] Flat

See (4)	See (2)	(2) Proposed allowable amount of soil retained on 8" dia. sieve.	(3) Sieve No.	Cum. Mass Retained (g)	Partial Test Specimen	Total Specimen % Finer N'
			3 "			
			2 "			
			1-1/2"			
			1 "			
			3/4 "			
			1/2 "			
			3/8 "			
		325	#4	0		100
		180	#10	0.5		99.8
		115	#20	3.2		99
		75	#40	15		95.4
		60	#60	48.4		85
		40	#100	111.2		65.6
		30	#140*	166.73		48.4
		20	#200	219.6		32
			Pan	227.9	XXXXXXXX	XXXXXXXXXX

SUMMARY: Shape & Filter Parameters

% COBBLES	---	D60	0.134	D85	0.25
% GRAVEL	0.0	D30	---	D50	0.11
% SAND	68.0	D10	---	D15	---
% FINES	32.0	Cu =	---	Cc =	---

* Denotes sieve added to better define gradation curve

$Cu = D_{60} / D_{10}$

$Cc = D_{30}^2 / (D_{60} * D_{10})$

(1) X in box denotes sieve on which split was made.

(2) Proposed allowable amount of soil retained on 8" dia. Sieve.

(3) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.

(4) ** denotes multiple sieve iterations to avoid overloading.

Mica Noted: x No [ ] Yes Amount Adjective: _____

Particle Hardness

[ ] Hard [ ] Soft [ ] Weathered

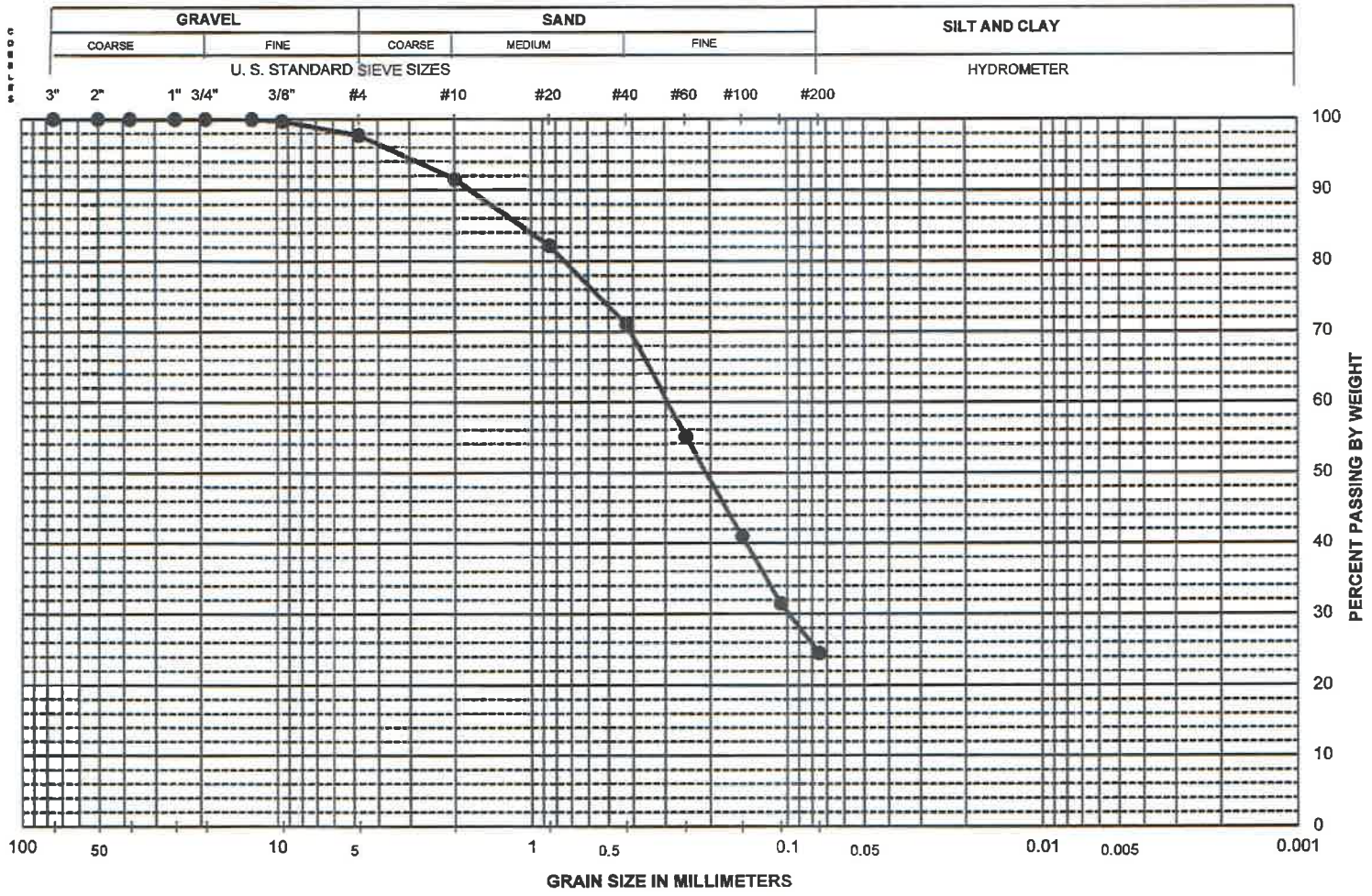
CALCULATED BY: LV

SET-UP BY: TJO DATE 09/09/13 CHECKED BY: TJO SUBMITTED BY: _____

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0310

URS

UNIFIED SOIL CLASSIFICATION



Sieve No.	Dia. mm	% Finer
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.00	100.0
1/2"	12.50	100.0
3/8"	9.50	99.7
#4	4.75	97.7
#10	2.00	91.5
#20	0.850	82.2
#40	0.425	71.1
#60	0.250	55.0
#100	0.150	41.0
#140	0.106	31.5
#200	0.075	24.5
Hydrometer Analysis		

% Cobbles	—
% Gravel	2.3
% Sand	73.2
% Fines	24.5
D_{85}	1.100
D_{60}	0.295
D_{50}	0.208
D_{30}	0.098
D_{15}	—
D_{10}	—
C_u	—
C_c	—

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 μm	Description and Classification
Well 13		460 ~ 470	•	—	—	—	—	Gray silty Sand (SM)

PROJECT NAME: City of Torrance
PROJECT NUMBER: 29869072.00005

PARTICLE-SIZE DISTRIBUTION CURVES

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0460

URS

GRADATION OF SOILS by Sieving using Soil Sieve Sizes & with Water Content

ASTM D422, ASTM D6913 and D2216

Project Number: _____ Task Number: _____ Boring No.: Well 13

Project Name: City of Torrance Sample No.: _____

Project Engineer: BP Depth (ft): 460 ~ 470

Visual Description: Gray silty Sand (SM)

SPECIMEN: Selected From:

Bulk Sample	x		Other - Jar
SPT Sample			Thin-Walled Tube
Calif. Sample			Engr. Test Specimen's WC

[ ] Whole sample used

[ ] See Bulk Sample Processing Form

Selection Method(s) & Sieve Range:

_____ Sieves (1) - whole sample used

x Sieves (1) - partial sample used & selected by Method(s)

c Selection Method

(a): Splitter; (use for dry soils or that which will segregate)

(b): Quartering; (use for dry soils or that which will segregate)

(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

Preparation: Sample/Specimen:

As-Received	x
Air Dried	
Oven-Dried	

Test Method (D6913)

Method A	
Method B	x

Oven-Dried Soil Broken Up Before:

Selecting partial sample: No [x] Yes [ ]

By: [ ] Mortar & Pestle [ ] Hand [ ] Pulverizer [ ] Other

Washing:

	No	Yes
Whole Specimen Washed on No. 200 sieve ?		x
Retained Fraction: 1st Split Washed ?		
Fine Fraction Washed on No. 200 sieve ?		

and Soil Soaked for: 6 hrs.

MASS OF TEST SPECIMEN (g)	Total Test Specimen with Coarse Fraction	Partial or Whole Test Specimen	Soil Retained (after washing)	Water Content: As Recieved or Container No.	
Min.sieve size in sieving sequence (3)	#N/A	# 200	+200	Wet, M1 (g)	
Container Number		x30	x30	Dry, M2 (g)	XXX
Mass of Container and Dry Soil, (g)		544.76	448.9	Cont.,M3 (g)	XXX
Mass of Container, (g)		139.63	139.7	Water Content (%)	NA
Dry Soil, Ws (g)		405.13	309.2		

SIEVING RESULTS

% error: 0.00

See (1)	Sieve No.	Cum. Mass Retained (g)	Total Specimen % Finer N'
	3 "		
	2 "		
	1 1/2"		
	1 "		
	3/4 "		
	1/2 "		
	3/8 "		
	4		
	Pan		XXXXXXXX

Req. Mass of Test Spec. for 1% (kg)
3"= 70
1 1/2"=10
3/4"= 1.1
3/8"= 0.25
#4 = 0.1
#10 = 0.1

Shape of Grains

[ ] Rounded

[ ] Angular

[ ] Flat

See (2)	(3) Sieve No.	Cum. Mass Retained (g)	Partial Test Specimen	Total Specimen % Finer N'
(2) Proposed allowable amount of soil retained on 8" dia. sieve.	3 "			
	2 "			
	1-1/2"			
	1 "			
	3/4 "			
See (4)	1/2 "	0		100
	3/8 "	1.3		99.7
325	#4	9.4		97.7
180	#10	34.5		91.5
115	#20	72.1		82.2
75	#40	117.1		71.1
60	#60	182.3		55
40	#100	239.1		41
30	#140*	277.4		31.5
20	#200	305.9		24.5
	Pan	309.2	XXXXXXXX	XXXXXXXXXX

SUMMARY: Shape & Filter Parameters

% COBBLES	---	D60	0.295	D85	1.10
% GRAVEL	2.3	D30	0.098	D50	0.21
% SAND	73.2	D10	---	D15	---
% FINES	24.5	Cu =	---	Cc =	---

* Denotes sieve added to better define gradation curve

$Cu = D_{60} / D_{10}$

$Cc = D_{30}^2 / (D_{60} * D_{10})$

(1) X in box denotes sieve on which split was made.

(2) Proposed allowable amount of soil retained on 8" dia. Sieve.

(3) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.

(4) ** denotes multiple sieve iterations to avoid overloading.

Mica Noted: x No [ ] Yes Amount Adjective: _____

Particle Hardness

[ ] Hard [ ] Soft [ ] Weathered

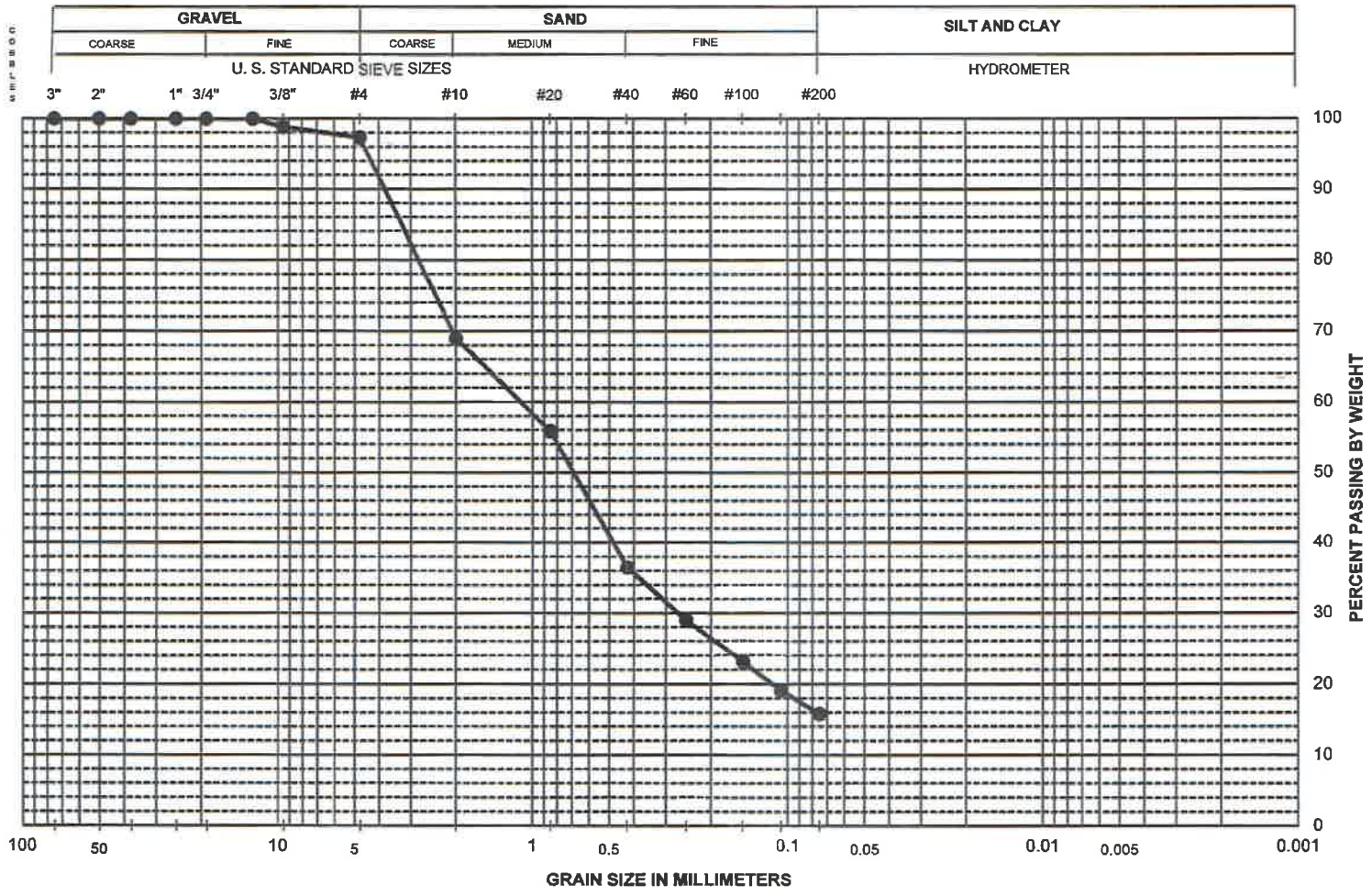
CALCULATED BY: LV

SET-UP BY: TJO DATE 09/09/13 CHECKED BY: TJO SUBMITTED BY: _____

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0460

URS

UNIFIED SOIL CLASSIFICATION



Sieve No.	Dia. mm	% Finer
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.00	100.0
1/2"	12.50	100.0
3/8"	9.50	98.8
#4	4.75	97.3
#10	2.00	69.0
#20	0.850	55.8
#40	0.425	36.5
#60	0.250	28.9
#100	0.150	23.1
#140	0.106	19.1
#200	0.075	15.8
Hydrometer Analysis		

% Cobbles	—
% Gravel	2.7
% Sand	81.5
% Fines	15.8
D_{85}	3.262
D_{60}	1.116
D_{50}	0.690
D_{30}	0.270
D_{15}	—
D_{10}	—
C_u	—
C_c	—

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 µm	Description and Classification
Well 13		540 ~ 550	●	—	—	—	—	**Gray silty Sand (SM)**

PROJECT NAME: **City of Torrance**

PROJECT NUMBER: **29869072.00005**

PARTICLE-SIZE DISTRIBUTION CURVES

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0540

URS

GRADATION OF SOILS by Sieving using Soil Sieve Sizes & with Water Content
ASTM D422, ASTM D6913 and D2216

Project Number: _____ Task Number: _____ Boring No.: Well 13

Project Name: City of Torrance Sample No.: _____

Project Engineer: BP Depth (ft): 540 ~ 550

Visual Description: Gray silty Sand (SM)

SPECIMEN: Selected From:

Bulk Sample	x		Other - Jar
SPT Sample			Thin-Walled Tube
Calif. Sample			Engr. Test Specimen's WC

[ ] Whole sample used
[ ] See Bulk Sample Processing Form

Selection Method(s) & Sieve Range:

_____ Sieves (1) - whole sample used
x Sieves (1) - partial sample used & selected by Method(s)
c Selection Method
(a): Splitter; (use for dry soils or that which will segregate)
(b): Quartering; (use for dry soils or that which will segregate)
(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

Preparation: Sample/Specimen:

As-Received	x
Air Dried	
Oven-Dried	

Test Method (D6913)

Method A	
Method B	x

Oven-Dried Soil Broken Up Before:
Selecting partial sample: No x Yes
By: [ ] Mortar & Pestle [ ] Hand [ ] Pulverizer [ ] Other

Washing:

	No	Yes
Whole Specimen Washed on No. 200 sieve ?		x
Retained Fraction: 1st Split Washed ?		
Fine Fraction Washed on No. 200 sieve ?		

and Soil Soaked for: 6 hrs.

MASS OF TEST SPECIMEN (g)	Total Test Specimen with Coarse Fraction	Partial or Whole Test Specimen	Soil Retained (after washing)	Water Content: As Recieved or Container No.	
Min.sieve size in sieving sequence (3)	#N/A	# 200	+200	Wet, M1 (g)	
Container Number		x12	x12	Dry, M2 (g)	XXX
Mass of Container and Dry Soil, (g)		694.4	612	Cont.,M3 (g)	XXX
Mass of Container, (g)		154.93	155	Water Content (%)	NA
Dry Soil, Ws (g)		539.47	457		

% error: 0.09

SIEVING RESULTS

See (1)	Sieve No.	Cum. Mass Retained (g)	Total Specimen % Finer N'
	3 "		
	2 "		
	1 1/2"		
	1 "		
	3/4 "		
	1/2 "		
	3/8 "		
	4		
	Pan		XXXXXXXX

Req. Mass of Test Spec. for 1% (kg)
3"= 70
1 1/2"=10
3/4"= 1.1
3/8"= 0.25
#4 = 0.1
#10 = 0.1

Shape of Grains
[ ] Rounded
[ ] Angular
[ ] Flat

See (4)	See (2)	(3) Sieve No.	Cum. Mass Retained (g)	Partial Test Specimen	Total Specimen % Finer N'
		3 "			
		2 "			
		1-1/2"			
		1 "			
		3/4 "			
		1/2 "	0		100
		3/8 "	6.5		98.8
	325	#4	14.3		97.3
	180	#10	167.4		69
	115	#20	238.5		55.8
	75	#40	342.7		36.5
	60	#60	383.5		28.9
	40	#100	414.8		23.1
	30	#140*	436.5		19.1
	20	#200	454.3		15.8
		Pan	456.6	XXXXXXXX	XXXXXXXXXX

(2) Proposed allowable amount of soil retained on 8" dia. sieve.

SUMMARY: Shape & Filter Parameters

% COBBLES	---	D60	1.116	D85	3.26
% GRAVEL	2.7	D30	0.270	D50	0.69
% SAND	81.5	D10	---	D15	---
% FINES	15.8	Cu =	---	Cc =	---

* Denotes sieve added to better define gradation curve
$Cu = D_{60} / D_{10}$
$Cc = D_{30}^2 / (D_{60} * D_{10})$

(1) X in box denotes sieve on which split was made.
(2) Proposed allowable amount of soil retained on 8" dia. Sieve.
(3) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.
(4) ** denotes multiple sieve iterations to avoid overloading.

Mica Noted: x No [ ] Yes Amount Adjective: _____

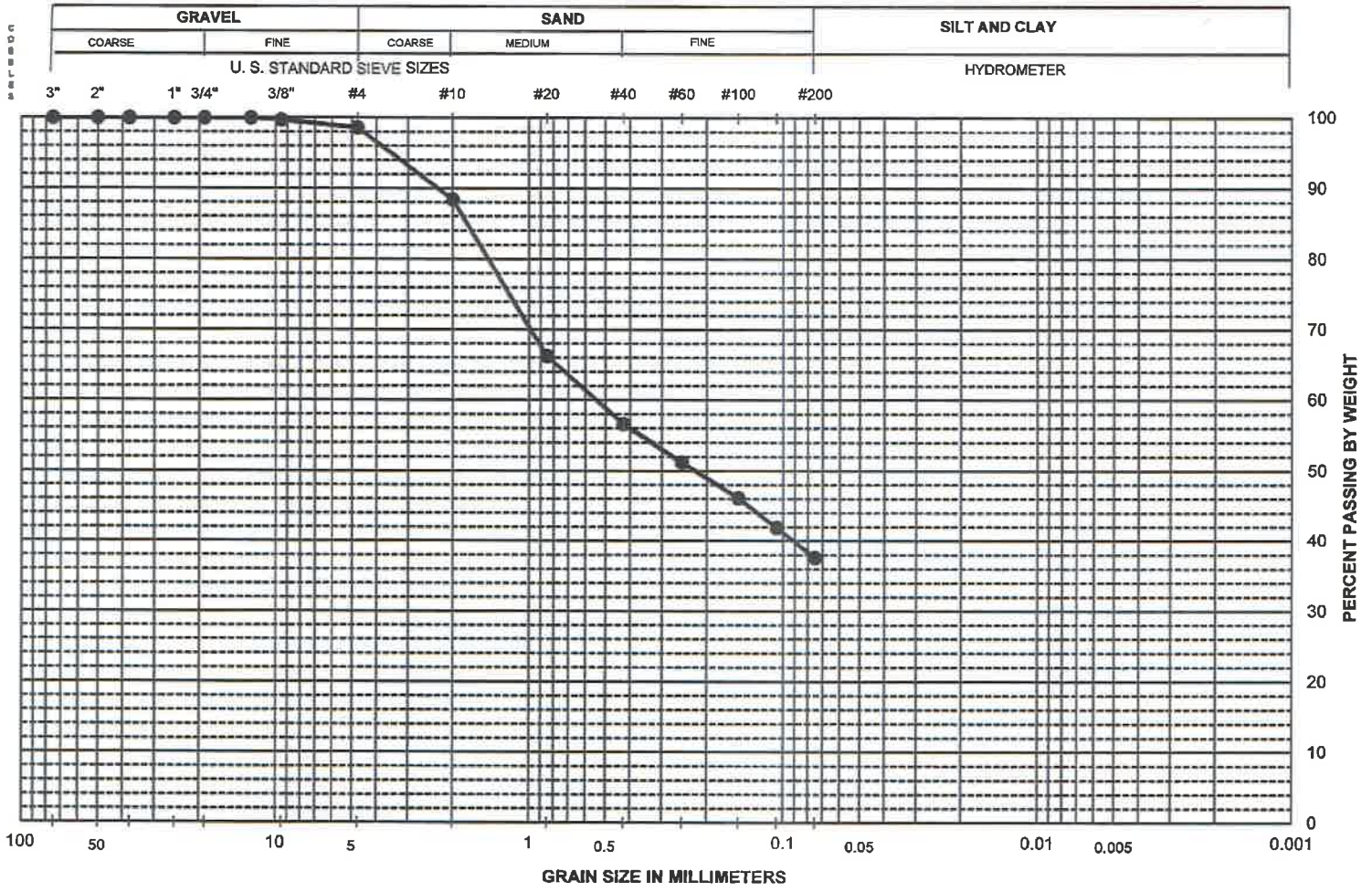
Particle Hardness
[ ] Hard [ ] Soft [ ] Weathered

CALCULATED BY: LV

SET-UP BY: TJO DATE 09/09/13 CHECKED BY: TJO SUBMITTED BY: _____

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0540 URS

UNIFIED SOIL CLASSIFICATION



Sieve No.	Dia. mm	% Finer
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.00	100.0
1/2"	12.50	100.0
3/8"	9.50	99.7
#4	4.75	98.6
#10	2.00	88.4
#20	0.850	66.2
#40	0.425	56.6
#60	0.250	51.2
#100	0.150	46.1
#140	0.106	41.9
#200	0.075	37.6
Hydrometer Analysis		

% Cobbles	—
% Gravel	1.4
% Sand	61.0
% Fines	37.6
D_{85}	1.754
D_{60}	0.543
D_{50}	0.222
D_{30}	—
D_{15}	—
D_{10}	—
C_u	—
C_c	—

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 µm	Description and Classification
Well 13		580 ~ 590	●	—	—	—	—	Gray silty Sand (SM)

PROJECT NAME: City of Torrance

PROJECT NUMBER: 29869072.00005

PARTICLE-SIZE DISTRIBUTION CURVES

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0580

URS

GRADATION OF SOILS by Sieving using Soil Sieve Sizes & with Water Content
ASTM D422, ASTM D6913 and D2216

Project Number: _____ Task Number: _____ Boring No.: Well 13

Project Name: City of Torrance Sample No.: _____

Project Engineer: BP Depth (ft): 580 ~ 590

Visual Description: Gray silty Sand (SM)

SPECIMEN: Selected From:

Bulk Sample	x		Other - Jar
SPT Sample			Thin-Walled Tube
Calif. Sample			Engr. Test Specimen's WC

[ ] Whole sample used
[ ] See Bulk Sample Processing Form

Selection Method(s) & Sieve Range:

_____ Sieves (1) - whole sample used
x Sieves (1) - partial sample used & selected by Method(s)
c Selection Method
(a): Splitter; (use for dry soils or that which will segregate)
(b): Quartering; (use for dry soils or that which will segregate)
(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

Preparation: Sample/Specimen:

As-Received	x
Air Dried	
Oven-Dried	

Test Method (D6913)

Method A	
Method B	x

Oven-Dried Soil Broken Up Before:

Selecting partial sample:	No	Yes
	x	

By: [ ] Mortar & Pestle [ ] Hand [ ] Pulverizer [ ] Other

Washing:

	No	Yes
Whole Specimen Washed on No. 200 sieve ?		x
Retained Fraction: 1st Split Washed ?		
Fine Fraction Washed on No. 200 sieve ?		

and Soil Soaked for: 6 hrs.

MASS OF TEST SPECIMEN (g)	Total Test Specimen with Coarse Fraction	Partial or Whole Test Specimen	Soil Retained (after washing)	Water Content: As Recieved or Container No.	
Min.sieve size in sieving sequence (3)	#N/A	# 200	+200	Wet, M1 (g)	
Container Number		x22	x22	Dry, M2 (g)	XXX
Mass of Container and Dry Soil, (g)		717.79	501.4	Cont.,M3 (g)	XXX
Mass of Container, (g)		133.56	133.6	Water Content (%)	NA
Dry Soil, Ws (g)		584.23	367.8		

SIEVING RESULTS % error: 0.16

See (1)	Sieve No.	Cum. Mass Retained (g)	Total Specimen % Finer N'
	3 "		
	2 "		
	1 1/2"		
	1 "		
	3/4 "		
	1/2 "		
	3/8 "		
	4		
	Pan		XXXXXXXX

Req. Mass of Test Spec. for 1% (kg)
3"= 70
1 1/2"=10
3/4"= 1.1
3/8"= 0.25
#4 = 0.1
#10 = 0.1

Shape of Grains
[ ] Rounded
[ ] Angular
[ ] Flat

See (2)	(3) Sieve No.	Cum. Mass Retained (g)	Partial Test Specimen	Total Specimen % Finer N'
(2) Proposed allowable amount of soil retained on 8" dia. sieve.	3 "			
	2 "			
	1-1/2"			
	1 "			
	3/4 "			
	1/2 "	0		100
See (4)	3/8 "	2		99.7
	#4	8.4		98.6
325	#10	67.9		88.4
180	#20	197.2		66.2
115	#40	253.6		56.6
75	#60	285.2		51.2
60	#100	314.9		46.1
40	#140*	339.7		41.9
30	#200	364.3		37.6
20	Pan	367.2	XXXXXXXX	XXXXXXXXXX

SUMMARY: Shape & Filter Parameters

% COBBLES	—	D60	0.543	D85	1.75
% GRAVEL	1.4	D30	—	D50	0.22
% SAND	61.0	D10	—	D15	—
% FINES	37.6	Cu =	—	Cc =	—

* Denotes sieve added to better define gradation curve

$Cu = D_{60} / D_{10}$

$Cc = D_{30}^2 / (D_{60} * D_{10})$

(1) X in box denotes sieve on which split was made.

(2) Proposed allowable amount of soil retained on 8" dia. Sieve.

(3) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.

(4) ** denotes multiple sieve iterations to avoid overloading.

Mica Noted: x No [ ] Yes Amount Adjective: _____

Particle Hardness
[ ] Hard [ ] Soft [ ] Weathered

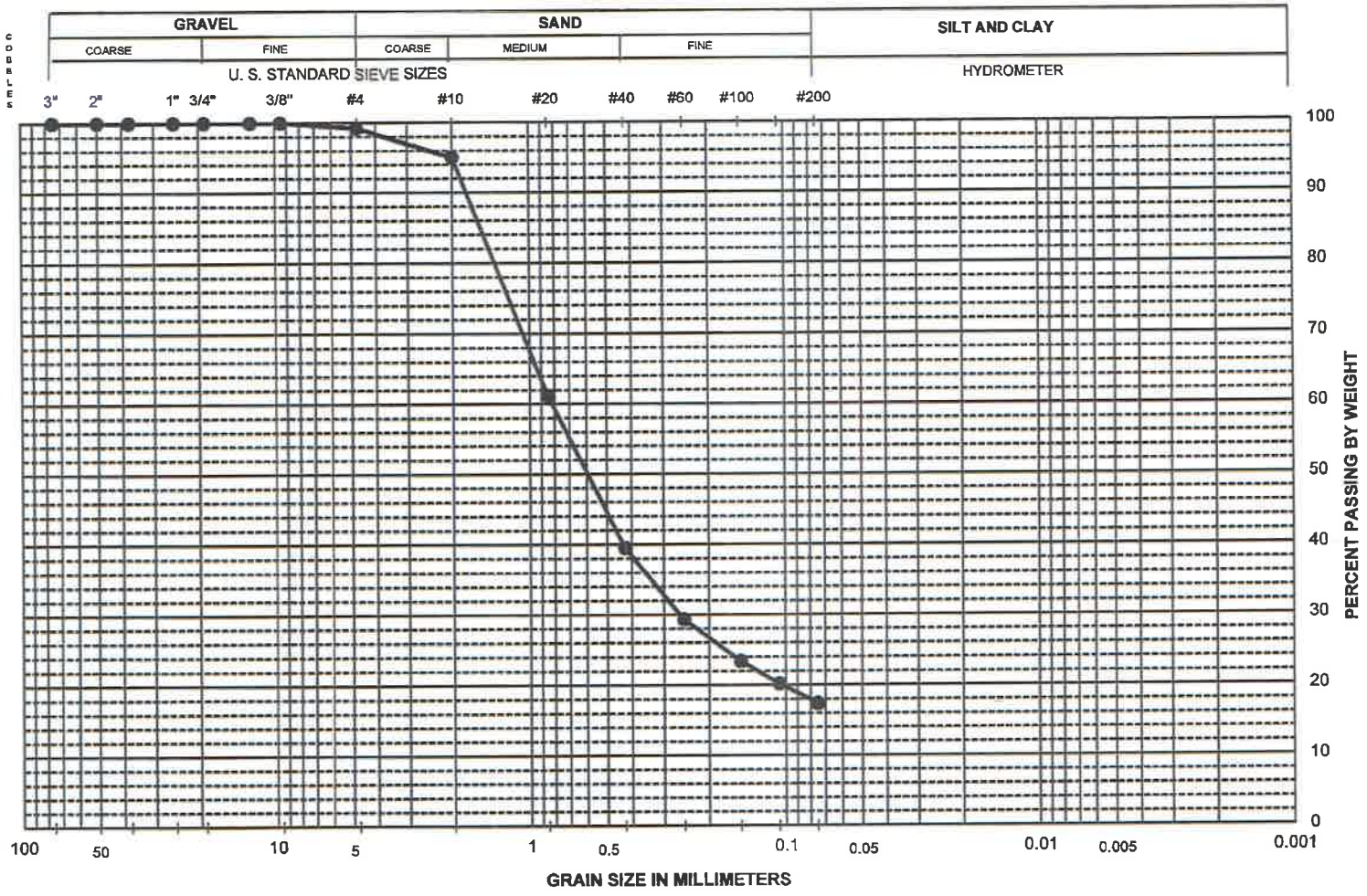
CALCULATED BY: LV

SET-UP BY: TJO DATE 09/09/13 CHECKED BY: TJO SUBMITTED BY: _____

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0580

URS

UNIFIED SOIL CLASSIFICATION



Sieve No.	Dia. mm	% Finer
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.00	100.0
1/2"	12.50	100.0
3/8"	9.50	100.0
#4	4.75	99.2
#10	2.00	95.0
#20	0.850	61.2
#40	0.425	39.5
#60	0.250	29.3
#100	0.150	23.4
#140	0.106	20.2
#200	0.075	17.4
Hydrometer Analysis		

% Cobbles	—
% Gravel	0.8
% Sand	81.8
% Fines	17.4
D_{85}	1.553
D_{60}	0.818
D_{50}	0.594
D_{30}	0.259
D_{15}	—
D_{10}	—
C_u	—
C_c	—

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 μm	Description and Classification
Well 13		620 ~ 630	●	—	—	—	—	Gray silty Sand (SM)

PROJECT NAME: City of Torrance
PROJECT NUMBER: 29869072.00005

PARTICLE-SIZE DISTRIBUTION CURVES

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0620

URS

GRADATION OF SOILS by Sieving using Soil Sieve Sizes & with Water Content

ASTM D422, ASTM D6913 and D2216

Project Number: _____ Task Number: _____ Boring No.: Well 13

Project Name: City of Torrance Sample No.: _____

Project Engineer: BP Depth (ft): 620 ~ 630

Visual Description: Gray silty Sand (SM)

SPECIMEN: Selected From:

Bulk Sample	x		Other - Jar
SPT Sample			Thin-Walled Tube
Calif. Sample			Engr. Test Specimen's WC

[ ] Whole sample used

[ ] See Bulk Sample Processing Form

Selection Method(s) & Sieve Range:

_____ Sieves (1) - whole sample used

x Sieves (1) - partial sample used & selected by Method(s)

c Selection Method

(a): Splitter; (use for dry soils or that which will segregate)

(b): Quartering; (use for dry soils or that which will segregate)

(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

Preparation: Sample/Specimen:

As-Received	x
Air Dried	
Oven-Dried	

Test Method (D6913)

Method A	
Method B	x

Oven-Dried Soil Broken Up Before:

Selecting partial sample: No [x] Yes [ ]

By: [ ] Mortar & Pestle [ ] Hand [ ] Pulverizer [ ] Other

Washing:

	No	Yes
Whole Specimen Washed on No. 200 sieve ?		x
Retained Fraction: 1st Split Washed ?		
Fine Fraction Washed on No. 200 sieve ?		

and Soil Soaked for: 6 hrs.

MASS OF TEST SPECIMEN (g)	Total Test Specimen with Coarse Fraction	Partial or Whole Test Specimen	Soil Retained (after washing)	Water Content: As Recieved or Container No.	
Min.sieve size in sieving sequence (3)	#N/A	# 200	+200	Wet, M1 (g)	
Container Number		x9	x9	Dry, M2 (g)	XXX
Mass of Container and Dry Soil, (g)		580.31	504.1	Cont.,M3 (g)	XXX
Mass of Container, (g)		134.43	134.45	**Water Content (%)**	**NA**
Dry Soil, Ws (g)		445.88	369.65		

SIEVING RESULTS % error: 0.01

See (1)	Sieve No.	Cum. Mass Retained (g)	Total Specimen % Finer N'
	3 "		
	2 "		
	1 1/2"		
	1 "		
	3/4 "		
	1/2 "		
	3/8 "		
	4		
	Pan		XXXXXXXX

Req. Mass of Test Spec. for 1% (kg)
3"= 70
1 1/2"=10
3/4"= 1.1
3/8"= 0.25
#4 = 0.1
#10 = 0.1

Shape of Grains

[ ] Rounded

[ ] Angular

[ ] Flat

See (2)	(3) Sieve No.	Cum. Mass Retained (g)	Partial Test Specimen	Total Specimen % Finer N'
(2) Proposed allowable amount of soil retained on 8" dia. sieve.	3 "			
	2 "			
	1-1/2"			
	1 "			
	3/4 "			
	1/2 "			
See (4)	3/8 "	0		100
325	#4	3.4		99.2
180	#10	22.1		95
115	#20	172.9		61.2
75	#40	269.8		39.5
60	#60	315.1		29.3
40	#100	341.5		23.4
30	#140*	355.7		20.2
20	#200	368.2		17.4
	Pan	369.7	XXXXXXXX	XXXXXXXXX

SUMMARY: Shape & Filter Parameters

% COBBLES	---	D60	0.818	D85	1.55
% GRAVEL	0.8	D30	0.259	D50	0.59
% SAND	81.8	D10	---	D15	---
% FINES	17.4	Cu =	---	Cc =	---

* Denotes sieve added to better define gradation curve

$Cu = D_{60} / D_{10}$

$Cc = D_{30}^2 / (D_{60} * D_{10})$

(1) X in box denotes sieve on which split was made.

(2) Proposed allowable amount of soil retained on 8" dia. Sieve.

(3) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.

(4) ** denotes multiple sieve iterations to avoid overloading.

Mica Noted: x No [ ] Yes Amount Adjective: _____

Particle Hardness

[ ] Hard [ ] Soft [ ] Weathered

CALCULATED BY: LV

SET-UP BY: TJO DATE 09/09/13 CHECKED BY: TJO SUBMITTED BY: _____

T:\2013\City of Torrance\Deliverables\01. #13\01. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 13 0620 **URS**

ATTACHMENT D

Water Quality Analysis for Isolated Aquifer Zone Testing

Zone Testing Analytical Results for Pilot Boring #13
City of Torrance - Department of Public Works
(Torrance, California)

Compound	Analytical Method	Units	Zone 2 (456 to 476)	Zone 3 (275 to 295)	Zone 4 (195 to 215)	Primary MCL	PHG	NL	Secondary MCL
Aggressive Index	---	---	11.26	11.42	11.09				
Langlier Index	---	---	-0.24	-0.10	-0.43				
3-Hydroxycarbofuran	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Aldicarb	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Aldicarb Sulfone	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Aldicarb Sulfoxide	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Carbaryl	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Carbofuran	EPA 531.1	ug/L	<2.0	<2.0	<2.0	18	1.7	---	---
Methiocarb	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Methomyl	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Oxamyl	EPA 531.1	ug/L	<2.0	<2.0	<2.0	50	26	---	---
Propoxur (Baygon)	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Glyphosate	EPA 547	ug/L	<5.0	<5.0	<5.0	700	900	---	---
Diquat	EPA 549.2	ug/L	<4.0	<4.0	<4.0	20	15	---	---
Chromium, Hexavalent	EPA 218.6	ug/L	<0.20	<0.20	<0.20	---	0.02	---	---
Fluoride	EPA 300.0	mg/L	0.34	0.32	0.25	2	1	---	---
Chloride	EPA 300.0	mg/L	25	26	23	---	---	---	250, 500, 600
Nitrite (as N)	EPA 300.0	mg/L	<0.10	<0.10	<0.10	1	1	---	---
Nitrate (as N)	EPA 300.0	mg/L	<0.10	<0.10	<0.10	10	10	---	---
Sulfate	EPA 300.0	mg/L	0.67J	4	2	---	---	---	250, 500, 600
Perchlorate	EPA 331.0 (M)	ug/L	<1.0	<1.0	<1.0	6	6	---	---
Color	SM 2120 B	Color unit	15	5	5	---	---	---	15
Turbidity	SM 2130 B	NTU	0.05	0.1	3.9	---	---	---	5
Odor	SM 2150 B	TON	<2.0	<2.0	<2.0	---	---	---	3
Alkalinity, Total (as CaCO3)	SM 2320B	mg/L	204	196	182	---	---	---	---
Bicarbonate (as CaCO3)	SM 2320B	mg/L	204	196	182	---	---	---	---
Carbonate (as CaCO3)	SM 2320B	mg/L	<1.0	<1.0	<1.0	---	---	---	---
Hydroxide (as CaCO3)	SM 2320B	mg/L	<1.0	<1.0	<1.0	---	---	---	---
Hardness, Total (as CaCO3)	SM 2340C	mg/L	120	120	110	---	---	---	---
Specific Conductance	SM 2510 B	umhos/cm	440	450	380	---	---	---	900, 1600, 2200
Solids, Total Dissolved	SM 2540 C	mg/L	300	290	260	---	---	---	500, 1000, 1500
pH	SM 4500 H+ B	pH units	7.56BV,BU	7.62BV,BU	7.41BV,BU	---	---	---	---
MBAS	SM 5540C	mg/L	<0.10	<0.10	<0.10	---	---	---	0.5
Nitrate as NO3	Total Nitrate by Calc	mg/L	<0.44	<0.44	<0.44	45	45	---	---
Potassium	EPA 200.7	mg/L	6.75	5.24	5.18	---	---	---	---
Boron	EPA 200.7	mg/L	0.195	0.138	0.106B	---	---	1	---
Silicon	EPA 200.7	mg/L	17.1	13.8	11.4	---	---	---	---
Total Silica	EPA 200.7	mg/L	36.6	29.5	24.4	---	---	---	---
Arsenic	EPA 200.8	mg/L	<0.00100	<0.00100	<0.00100	0.01	0.000004	---	---
Chromium	EPA 200.8	mg/L	0.0006895	0.0006001	0.000759J	0.05	withdrawn	---	---
Copper	EPA 200.8	mg/L	0.0014	0.000502J	0.00306	1.3	0.3	---	1
Vanadium	EPA 200.8	mg/L	0.000240J	<0.00100	0.000524J	---	---	0.05	---
Zinc	EPA 200.8	mg/L	0.0195	0.0071	0.00847	---	---	---	5
Aluminum	EPA 200.8	mg/L	0.0118	0.00609J	0.329	1	0.6	---	0.2
Calcium	EPA 200.8	mg/L	39.9	32.5	27.4	---	---	---	---
Iron	EPA 200.8	mg/L	0.108	0.073	0.514	---	---	---	0.3
Magnesium	EPA 200.8	mg/L	10.6	11.2	11	---	---	---	---
Manganese	EPA 200.8	mg/L	0.0134	0.0301	0.0314	---	---	0.5	0.05
Sodium	EPA 200.8	mg/L	60.7	56.4	46.6	---	---	---	---
1,2-Dibromoethane	EPA 504.1	ug/L	<0.010	<0.010	<0.010	0.05	0.01	---	---
1,2-Dibromo-3-Chloropropane (DBCP)	EPA 504.1	ug/L	<0.010	<0.010	<0.010	0.2	0.0017	---	---
4,4'-DDD	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
4,4'-DDE	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
4,4'-DDT	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Aldrin	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Alpha-BHC	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Beta-BHC	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Chlordane	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Delta-BHC	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Dieldrin	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Endosulfan I	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Endosulfan II	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Endosulfan Sulfate	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Endrin	EPA 508	ug/L	<0.010	<0.010	<0.010	2	1.8	---	---
Endrin Aldehyde	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Gamma-BHC	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Heptachlor	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Heptachlor Epoxide	EPA 508	ug/L	<0.010	<0.010	<0.010	0.01	0.008	---	---
Methoxychlor	EPA 508	ug/L	<0.010	<0.010	<0.010	0.01	0.006	---	---
Toxaphene	EPA 508	ug/L	<1.0	<1.0	<1.0	30	0.9	---	---
Aroclor-1016	EPA 508	ug/L	<0.10	<0.10	<0.10	3	0.03	---	---
Aroclor-1221	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Aroclor-1232	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Aroclor-1242	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Aroclor-1248	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Aroclor-1254	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Aroclor-1260	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
2,4,5-T	EPA 515.1	ug/L	<0.12	<0.12	<0.12	---	---	---	---
2,4,5-TP (Silvex)	EPA 515.1	ug/L	<0.12	<0.12	<0.12	50	25	---	---
2,4-D	EPA 515.1	ug/L	<0.50	<0.50	<0.50	---	---	---	---
2,4-DB	EPA 515.1	ug/L	<0.50	<0.50	<0.50	---	---	---	---
3,5-Dichlorobenzoic Acid	EPA 515.1	ug/L	<0.25	<0.25	<0.25	---	---	---	---
Acifluorfen	EPA 515.1	ug/L	<0.25	<0.25	<0.25	---	---	---	---
Bentazon	EPA 515.1	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Chloramben	EPA 515.1	ug/L	<0.25	<0.25	<0.25	---	---	---	---
DCPA	EPA 515.1	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Dalapon	EPA 515.1	ug/L	<0.50	<0.50	<0.50	200	790	---	---
Dicamba	EPA 515.1	ug/L	<0.25	<0.25	<0.25	---	---	---	---
Dichlorprop	EPA 515.1	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Dinoseb	EPA 515.1	ug/L	<0.50	<0.50	<0.50	7	14	---	---

Zone Testing Analytical Results for Pilot Boring #13
City of Torrance - Department of Public Works
(Torrance, California)

Compound	Analytical Method	Units	Zone 2 (456 to 476)	Zone 3 (275 to 295)	Zone 4 (195 to 215)	Primary MCL	PHG	NL	Secondary MCL
Pentachlorophenol	EPA 515.1	ug/L	<0.050	<0.050	<0.050	—	—	—	—
Picloram	EPA 515.1	ug/L	<0.25	<0.25	<0.25	500	500	—	—
2,4-Dinitrotoluene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
2,6-Dinitrotoluene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Acenaphthylene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Alachlor	EPA 525.2	ug/L	<0.50	<0.50	<0.50	20	4	—	—
Ametryn	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Anthracene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Atraton	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Atrazine	EPA 525.2	ug/L	<0.50	<0.50	<0.50	1	0.15	—	—
Benzo (a) Anthracene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Benzo (a) Pyrene	EPA 525.2	ug/L	<0.10	<0.10	<0.10	2	0.007	—	—
Benzo (b) Fluoranthene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Benzo (g,h,i) Perylene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Benzo (k) Fluoranthene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Bis(2-Ethylhexyl) Phthalate	EPA 525.2	ug/L	<2.0	0.33B,J	0.33B,J	—	—	—	—
Bromacil	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Butachlor	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Butyl Benzyl Phthalate	EPA 525.2	ug/L	<2.0	0.31B,J	0.33B,J	—	—	—	—
Butylate	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Chlorpropham	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Chrysene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Cyanazine	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Cycloate	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Di(2-ethylhexyl)adipate	EPA 525.2	ug/L	<2.0	<2.0	<2.0	400	200	—	—
Di-n-Butyl Phthalate	EPA 525.2	ug/L	0.43B,J	0.71B,J	0.71B,J	—	—	—	—
Dibenz (a,h) Anthracene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Diethyl Phthalate	EPA 525.2	ug/L	0.072J	0.070J	0.066J	—	—	—	—
Dimethyl Phthalate	EPA 525.2	ug/L	<2.0	<2.0	<2.0	—	—	—	—
Diphenamid	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
EPTC	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Fenarimol	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Fluorene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Fluridone	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Hexachlorobenzene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	1	0.03	—	—
Hexachlorocyclopentadiene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	50	50	—	—
Hexazinone	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Indeno (1,2,3-c,d) Pyrene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Isophorone	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
MGK-264	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Metolachlor	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Molinate	EPA 525.2	ug/L	<0.50	<0.50	<0.50	20	1	—	—
Napropamide	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Norflurazon	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Pebulate	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Pentachlorophenol	EPA 525.2	ug/L	<2.0	<2.0	<2.0	1	0.3	—	—
Phenanthrene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Prometon	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Prometryn	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Pronamide	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Propachlor	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	9	—
Propazine	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Pyrene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Simazine	EPA 525.2	ug/L	<1.0	<1.0	<1.0	4	4	—	—
Simetryn	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Terbuthiuron	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Terbacil	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Terbutryn	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Thiobencarb	EPA 525.2	ug/L	<1.0	<1.0	<1.0	70	70	—	1
Triadimefon	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Tricyclazole	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Trifluralin	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Vernolate	EPA 525.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Endothall	EPA 548.1	ug/L	<45	<45	<45	100	580	—	—
Dichlorodifluoromethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	—	—	1	—
Chloromethane	EPA 524.2	ug/L	<0.50	1.9B	0.27B,J	—	—	—	—
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	1200	4000	—	—
Vinyl Chloride	EPA 524.2	ug/L	<0.50	<0.50	<0.50	0.5	0.05	—	—
Bromomethane	EPA 524.2	ug/L	0.26J	0.29J	0.51	—	—	—	—
Chloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Trichlorofluoromethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	150	700	—	—
Diethyl Ether	EPA 524.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
1,1-Dichloroethene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	6	10	—	—
Iodomethane	EPA 524.2	ug/L	0.95J	0.97J	1.8J	—	—	—	—
Acetone	EPA 524.2	ug/L	<10	19	2.6J	—	—	—	—
Carbon Disulfide	EPA 524.2	ug/L	<0.50	0.042J	<0.50	—	—	160	—
Allyl Chloride	EPA 524.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Methylene Chloride	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	4	—	—
Acrylonitrile	EPA 524.2	ug/L	<2.0	<2.0	<2.0	—	—	—	—
Methyl-t-Butyl Ether (MTBE)	EPA 524.2	ug/L	<0.50	<0.50	<0.50	0.013	13	—	0.005
t-1,2-Dichloroethene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	10	60	—	—
1,1-Dichloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	3	—	—
2-Butanone	EPA 524.2	ug/L	<2.0	<2.0	<2.0	—	—	—	—
c-1,2-Dichloroethene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	6	100	—	—
2,2-Dichloropropane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Methacrylonitrile	EPA 524.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Bromochloromethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
Tetrahydrofuran	EPA 524.2	ug/L	<5.0	<5.0	<5.0	—	—	—	—
Chloroform	EPA 524.2	ug/L	<0.50	<0.50	<0.50	—	—	—	—
1,1,1-Trichloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	200	1000	—	—

Zone Testing Analytical Results for Pilot Boring #13
City of Torrance - Department of Public Works
(Torrance, California)

Compound	Analytical Method	Units	Zone 2 (456 to 476)	Zone 3 (275 to 295)	Zone 4 (195 to 215)	Primary MCL	PHG	NL	Secondary MCL
1,1-Dichloropropene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Carbon Tetrachloride	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	0.1	---	---
1,2-Dichloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	0.5	0.4	---	---
Benzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	1	0.15	---	---
Trichloroethene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	1.7	---	---
1,2-Dichloropropane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	0.5	---	---
Methyl Methacrylate	EPA 524.2	ug/L	<5.0	<5.0	<5.0	---	---	---	---
Dibromomethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Bromodichloromethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
c-1,3-Dichloropropene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
4-Methyl-2-Pentanone	EPA 524.2	ug/L	<5.0	<5.0	<5.0	---	---	---	---
Toluene	EPA 524.2	ug/L	1.2	1.6	1.6	150	150	---	---
t-1,3-Dichloropropene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Ethyl Methacrylate	EPA 524.2	ug/L	<2.0	<2.0	<2.0	---	---	---	---
1,1,2-Trichloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	3	---	---
1,3-Dichloropropane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	0.5	0.2	---	---
Tetrachloroethene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	0.06	---	---
2-Hexanone	EPA 524.2	ug/L	<5.0	<5.0	<5.0	---	---	---	---
Dibromochloromethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
1,2-Dibromoethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Chlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
1,1,1,2-Tetrachloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Ethylbenzene	EPA 524.2	ug/L	0.085J	0.031J	<0.50	300	300	---	---
p/m-Xylene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	1750	1800	---	---
o-Xylene	EPA 524.2	ug/L	0.040J	<0.50	<0.50	1750	1800	---	---
Styrene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	100	0.5	---	---
Bromoform	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Isopropylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	770	---
1,1,2,2-Tetrachloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	[redacted]	0.1	---	---
t-1,4-Dichloro-2-Butene	EPA 524.2	ug/L	<5.0	<5.0	<5.0	---	---	---	---
1,2,3-Trichloropropane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	0.0007	0.005	---
Bromobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
n-Propylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	260	---
2-Chlorotoluene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	140	---
4-Chlorotoluene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	140	---
1,3,5-Trimethylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	330	---
tert-Butylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	260	---
1,2,4-Trimethylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	330	---
sec-Butylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	260	---
p-Isopropyltoluene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
1,3-Dichlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
1,4-Dichlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	6	---	---
n-Butylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	260	---
1,2-Dichlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	600	600	---	---
1,2-Dibromo-3-Chloropropane	EPA 524.2	ug/L	<2.0	<2.0	<2.0	0.2	0.0017	---	---
1,2,4-Trichlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	5	---	---
Hexachloro-1,3-Butadiene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Naphthalene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	17	---
1,2,3-Trichlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Ethanol	EPA 524.2	ug/L	<50	53	25J	---	---	---	---
1,2,3-Trichloropropane	SRL 524M-TCP	ug/L	<0.0050	<0.0050	<0.0050	---	0.0007	0.005	---

Notes:
MCL = Maximum Contaminant Level (Last updated January 30, 2013)
PHG = Public Health Goal
NL = Notification Limit (Last updated December 14, 2010)

ATTACHMENT E

RWQCB Work Plan Approval Letter for Honeywell Facility

CALIFORNIA
Water Boards

Los Angeles Regional Water Quality Control Board

December 21, 2012

Mr. Benny DeHghi, Manager
Remediation & Evaluation Services
Honeywell International, Inc.
2525 West 190th Street
Torrance, CA 90504-6099

SUBJECT: APPROVAL OF WORKPLAN FOR ADDITIONAL OFFSITE GROUNDWATER ASSESSMENT

SITE/CASE: HONEYWELL SITE A, 2525 WEST 190th STREET, TORRANCE, CALIFORNIA (SITE CLEANUP PROGRAM #1043, SITE ID #2040278)

Dear Mr. DeHghi:

The California Regional Water Quality Control Board, Los Angeles Region (Regional Board) is the public agency with primary responsibility for protection of ground and surface water and their beneficial uses within major portions of Los Angeles and Ventura Counties, including the subject property (Site).

Regional Board staff has reviewed the June 29, 2012 *Work Plan Additional Offsite B-Zone Groundwater Assessment* (Workplan), prepared by AMEC Environment & Infrastructure, Inc. (AMEC) on behalf of Honeywell International, Inc. (Honeywell). The Workplan proposes the installation of four cone penetration test (CPT) borings to further investigate the lateral downgradient extent of groundwater contamination within the intermediate depth "B-Zone" (Figure 1). The purpose of this investigation is to delineate the downgradient offsite lateral extent of groundwater impacts originating from the Site. The B-Zone is impacted with volatile organic compounds (VOCs) and 1,4-dioxane, which have been detected in offsite downgradient well monitoring well MW-18B. Therefore, further offsite investigation is needed to delineate the plume.

Based on our review of the Workplan and recent groundwater monitoring data, the proposed offsite groundwater investigation is approved. You may proceed with the fieldwork, with the following requirements:

1) Regional Board staff concurs with the proposed locations based on our review of the prior and current groundwater data and contaminant distribution trends. If significantly different alternate locations are necessary due to access restrictions or for other reasons, then Regional Board staff shall be notified at least 14-days prior to the scheduled fieldwork, so that those revised locations can be approved.

2) The Workplan proposes analyzing 1,4-dioxane and 1,2,3-TCP by USEPA Method SRL 524M with a target reporting limit of 2 µg/L. However, the reporting limits for 1,4-dioxane and 1,2,3-TCP must be below their respective California Department of Public Health (CDPH) notification levels of 1 µg/L and 0.005 µg/L, respectively.

3) Laboratory analyses must be conducted by a California Department of Public Health Environmental Laboratory Accreditation Program (ELAP)-approved laboratory with current state certification.

4) Prior to implementing fieldwork, you are required to secure all applicable permits from appropriate federal, state and local regulatory agencies for the proposed work as necessary. Copies of the agency-approved permits shall be included in the summary report submitted to the Regional Board.

5) Upon implementing the approved Workplan and completion of fieldwork, submit a summary report with your findings, conclusions and recommendations to the Regional Board by **June 28, 2013.**

6) If the goal of this investigation to fully delineate the groundwater plume is not met, you must conduct further assessment to fully characterize the downgradient lateral extent of the groundwater plume. If so, you are required to address any data gaps in your summary report and submit a supplemental workplan to the Regional Board by **July 31, 2013.**

7) Please notify Regional Board staff at least 14-days prior to conducting the fieldwork.

If you have any questions, please contact Mr. Steve Rowe, Project Manager at (213) 576-6755 or srowe@waterboards.ca.gov, or Ms. Thizar Tintut-Williams, Unit Chief, at (213) 576-6723 or twilliams@waterboards.ca.gov.

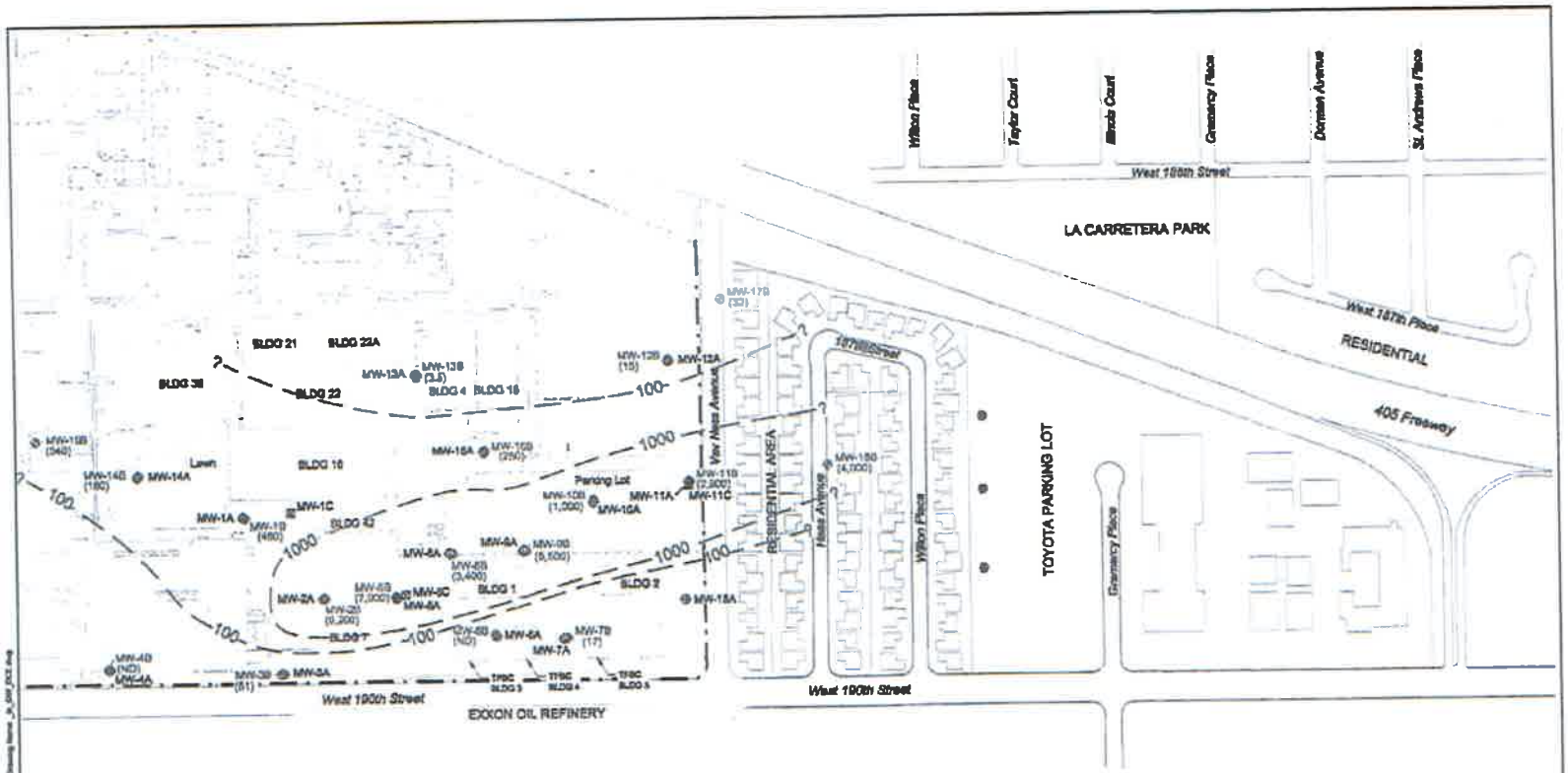
Sincerely,

Steve Rowe

Steve Rowe, P.G.
Engineering Geologist
Site Cleanup Program Unit III

Enclosures: Figure 1. Proposed CPT Locations

cc: Mr. David DeVries, AMEC Environment & Infrastructure



Explanation

- Proposed cone penetration test (CPT) location
- MW-1A ⊖ Perched zone (A-Zone) monitoring well
- MW-1B ⊕ Upper Gage-Gardena aquifer (B-zone) groundwater monitoring well
- (9,200) 1,1-DCE concentration in µg/L in the Upper Gage-Gardena aquifer (B-zone)
- —— Line of approximately equal concentration in µg/L in the Upper Gage-Gardena aquifer (B-zone)
- MW-1C ⊕ Lower Gage-Gardena aquifer (C-zone) groundwater monitoring well
- (ND) Not detected (refer to the lab report for detection limit

Note

Well locations MW-1A/1B to MW10A/10B surveyed by Dulin & Boynton Licensed Surveyors August and October 2005.

Approximate Scale in Feet

Proposed CPT Locations

Honeywell Site A, TFBC, & Storage Etc.
2525, 2203-2308, & 2545 West 190th Street
Torrance, California

By: pwh	Date: 06/20/12	Project No. 9112162480
amec		Figure 1

July 15, 2015

Project 8615180340

Steve Rowe, PG
California Regional Water Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, California 90013

Subject: **2015 First Semiannual Groundwater Monitoring Report**
Honeywell Site A
2525 West 190th Street
Torrance, California

Dear Mr. Rowe:

Amec Foster Wheeler Environment & Infrastructure, Inc. is pleased to submit this 2015 First Semiannual Groundwater Monitoring Report, on behalf of Honeywell International Inc., to the California Regional Water Quality Control Board, Los Angeles Region. The report presents the results of groundwater monitoring and sampling activities conducted at the subject Site during the first and second quarters of 2015.

If you have any questions regarding this report, please contact any of the undersigned at (510) 663-4100.

Sincerely yours,
Amec Foster Wheeler Environment & Infrastructure, Inc.

Greg Stemler, PG
Senior Geolgist

PROFESSIONAL GEOLOGIST
GREGORY F. STEMLER
12/31/15
No. 9028
STATE OF CALIFORNIA

Michael Taraszki, PG, CHG, PMP
Principal Hydrogeologist

CERTIFIED HYDROGEOLOGIST
MICHAEL D. TARASZKI
No. 586
EXP. 12/2016
STATE OF CALIFORNIA

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Enclosure

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