URS

Memorandum

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

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

Date: October XX, 2013

Subject: **PRELIMINARY WELL DESIGN FOR PILOT BORING #12**
185TH STREET WEST OF VAN NESS AVE.

Cc: 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 (#12) recently completed at 185th Street west 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 5/16"
Reamed Borehole	0 to 50 min. 50 to 130 130 to 750	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 140 190 to 270 500 to 640 730 to 740	Diameter Composition Thickness	18" OD Stainless Steel 304L 5/16"
Well Screen: Ful-Flo Louver Roscoe Moss Company	140 to 190 270 to 500 640 to 730	Diameter Composition Slot Thickness	18" OD Stainless Steel 316L TBD 5/16"
Bottom Cap Roscoe Moss Company (or equivalent)	740	Shape Composition	Semi-Elliptical Stainless Steel 304L
Cement Seal	0 to 100	Per specifications provided by City of Torrance	
Bentonite Seal (3/8" Chip)	100 to 110	Preventative Measure for Potential Grout Migration (minimum hydration 4 hours)	
Gravel Envelope Oglebay Norton Industrial Sands	110 to 750	Size Distribution Uniformity Coefficient Thickness (minimum)	TBD 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 498 (each)	Diameter Composition Connections Orientation	2" Standard Stainless Steel 304L Welded Collar-Interior Opposite Corners
Gravel Chute (one)	0 to 120	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 central portion of the Lynwood and upper 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. The secondary water quality secondary for specific conductance and total dissolved solids were exceeded in the shallowest zone (Zone #3) at concentrations of 910 micro mhos per centimeter (µmhos/cm) (standard is 900 µmhos/cm) and 630 milligrams per liter (mg/L) (standard is 500 mg/L), respectively. One emergent chemical (1,2,3-Trichloropropane) was detected in all three zones at concentrations slightly above the method detection limit at 0.0036J, 0.0047J, and 0.0059 micrograms per liter (µg/L) (public health goal is 0.0007 µg/L and notification limit is 0.005 µg/L).

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 #12 (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 #12
Attachment A	Draft Soil Boring Log for Pilot Boring #12
Attachment B	Geophysical Log by Pacific Surveys, Inc.
Attachment C	Sieve Analysis Performed by URS
Attachment D	Correspondence from Roscoe Moss Company
Attachment E	Work Plan to Delineate Groundwater Plume (Honeywell Facility)

FIGURES

Source: ESRI, Bing Maps Aerial, 2011.

N

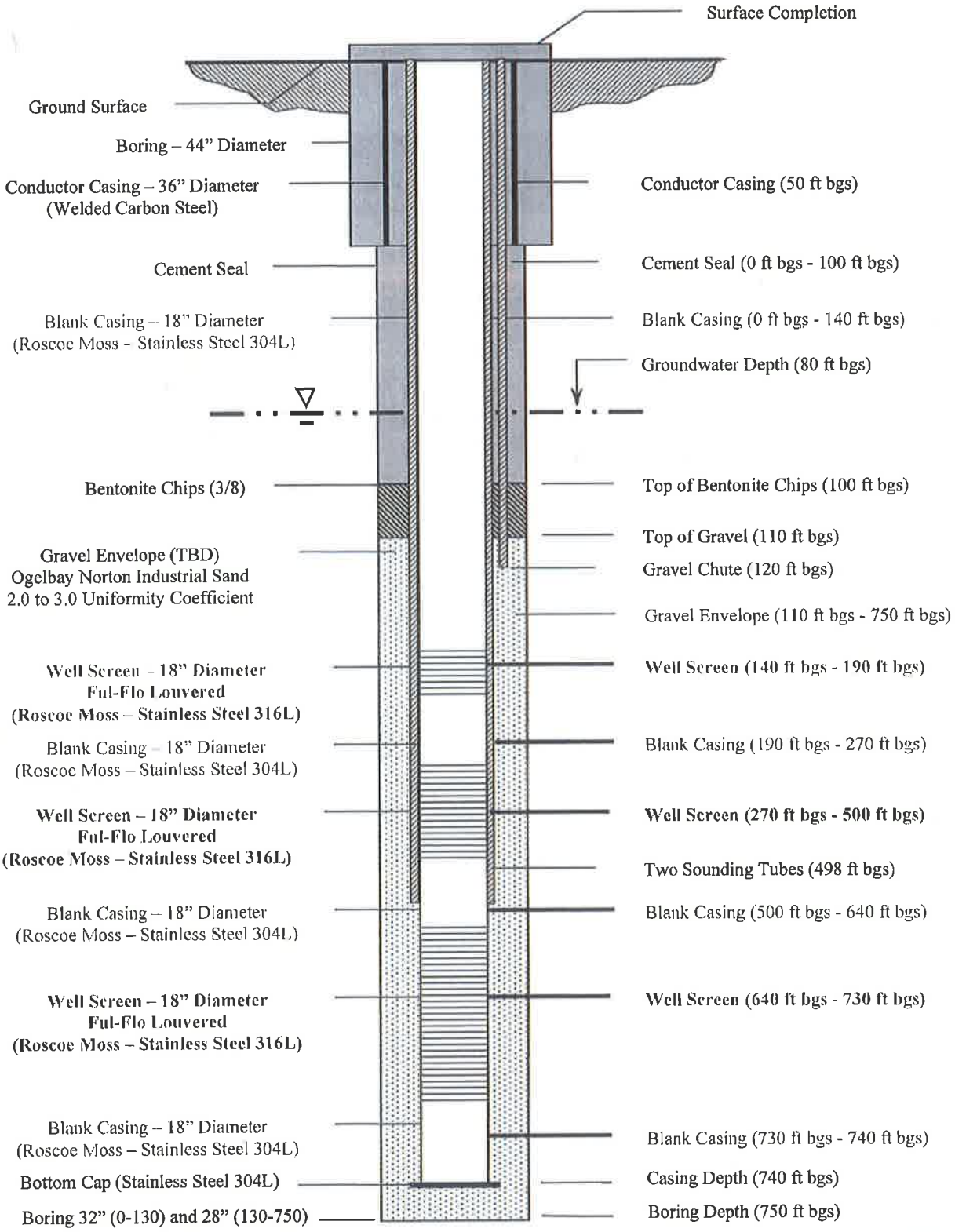
0 250 500
Feet

City of Torrance
Site Map
Figure 1 Well #12

September 2013

URS

I:\City of Torrance_Carlos_Lima\City of Torrance_fig1_Site12_23Sep2013.mxd



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Preliminary Construction Details for Well #12
(185th Street west of Van Ness Avenue)

Figure 2

ATTACHMENT A

Draft Soil Boring Log for Pilot Boring #12

Project: City of Torrance - Department of Public Works **Project Location:** 185th St. West of Van Ness Avenue **Project Number:** 29869072	**Log of Boring Pilot Boring #12** Sheet 1 of 7

Date(s) Drilled	08/23/13 (Bucket Auger), 09/05/13 - 09/09/13 (Reverse Rotary)	Logged By	C. Landaverde (0-635'), B. Partington (365'-773')	Checked By	B. Partington (PG 7612)
Drilling Method	Bucket Auger (0-50'), Reverse Rotary (50-773'),	Drilling Contractor	Barney's (Bucket Auger), Southwest (Reverse Rotary)	Total Depth of Borehole (feet)	773.0
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 08/23/13 to 50 ft bgs.				

Elevation, feet MSL / Depth, feet	SAMPLES: Type	SAMPLES: Sample Time	SAMPLES: pH	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
0					Dark Brown (10YR 3/3), fine silty SAND (SM), moist.				
5					Yellowish brown (10YR 5/6), fine silty SAND (SM), moist.			0730	08/23/13
10					Yellow brown (10YR 5/8), fine silty SAND (SM), moist.			0735	
15					SAA			0737	
20					Dark yellowish brown (10YR 4/4), fine silty SAND (SM), moist.			0741	
25					Brown (10YR 5/3), fine silty SAND (SM), moist.			0746	
30					Yellowish brown (10YR 5/4), fine silty SAND (SM), moist.			0751	
35					SAA			0756	
40					Grayish Brown (10YR 5/2), silt (ML), moist.			0800	
45					SAA			0849 0910	
50					Dark gray (10YR 4/1), CLAY (CL), wet.			0920 0940	
55					SAA			0830	09/05/13
60					SAA			1100	
65					Incease fine content				
70					Dark Gray (10YR 4/1), silty fine SAND (SM)			1250	
75									
80					Dark gray (10YR 4/1), fine SAND (SP), contains trace silt.			1546	
85					Dark Gray (10YR 4/1), CLAY (CL)				
90								1656	
95									
100									

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Project: City of Torrance - Department of Public Works
Project Location: 185th St. West of Van Ness Avenue
Project Number: 29869072

Log of Boring Pilot Boring #12

Sheet 2 of 7

Elevation, feet MSL	Depth, feet	SAMPLES Type	SAMPLES Sample Time	SAMPLES pH	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	100					Gray (10YR 5/1), fine SAND (SP), contains trace silt.			1820	
	105									
	110					Dark Gray (10YR 4/1), fine to medium SAND (SP).			1950	
	115									
	120					SAA			2055	
	125									
	130					Dark Gray (10YR 4/1), silty fine to medium SAND (SM), trace clay.			2130	
	135									
	140					Gray (10YR 5/1) fine SAND (SP), trace silt.			2251	
	145									
	150					Becomes fine to medium sand, present angular to sub-angular gravel.			0000	09/06/13
	155									Zone Test # 3 157 Ft to 177 Ft (11 gpm/ft)
	160					Gray (10YR 5/1), GRAVEL with sand (GP), trace clay, angular to sub-angular gravel, 1-inch to 1/2-inch gravel.			0230	
	165									
	170					SAA			0530	
	175									
	180					Gray (10YR 5/1), silty fine SAND (SM)			0732	
	185									
	190					SAA			0811	
	195									
	200					Dark gray (10YR 4/1), CLAY (CL) with sand.			0920	
	205									
	210					Becomes Gray (10YR 5/1).			1009	
	215									

Project: City of Torrance - Department of Public Works Project Location: 185th St. West of Van Ness Avenue Project Number: 29869072	**Log of Boring Pilot Boring #12** Sheet 3 of 7

Elevation, feet MSL	Depth, feet	SAMPLES: Type	SAMPLES: Sample Time	SAMPLES: pH	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	220					SAA			1045	09/06/13
	225									
	230					SAA			1130	
	235									
	240					Becomes Dark gray (10YR 4/1).			1200	
	245									
	250					SAA			1245	
	255									
	260					Gray (10YR 5/1), fine SAND (SP), trace silt.			1310	
	265									
	270								1350	
	275									
	280					SAA			1456	
	285									
	290					SAA			1603	
	295									
	300					SAA			1705	
	305									
	310					SAA			1820	
	315									
	320					SAA			1950	
	325									
	330					SAA			2130	

Project: City of Torrance - Department of Public Works
Project Location: 185th St. West of Van Ness Avenue
Project Number: 29869072

Log of Boring Pilot Boring #12

Sheet 4 of 7

Elevation, feet MSL	Depth, feet	SAMPLES Type	SAMPLES Sample Time	SAMPLES pH	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	335									09/06/13
	340					Trace silt.			2225	
	345									
	350					SAA			2316	
	355									
	360					Gray (10YR 5/1), silty fine SAND (SM), trace clay.			0050	09/07/13
	365									
	370					SAA			0255	
	375									
	380					SAA			0450	
	385									
	390					SAA			0630	
	395									
	400					Becomes very dark gray (10YR 3/1).			0727	
	405									
	410					Gray (10YR 5/1), fine SAND (SP), trace silt.			0854	
	415									
	420					SAA			0958	Zone Test # 2 419 Ft to 439 Ft (16 gpm/ft)
	425									
	430					Becomes gray (10YR 6/1), fine to medium sand (SP).			1200	09/07/13
	435									
	440					Becomes gray (10YR 5/1).			1324	
	445									
	450									

Project: City of Torrance - Department of Public Works
Project Location: 185th St. West of Van Ness Avenue
Project Number: 29869072

Log of Boring Pilot Boring #12

Sheet 5 of 7

Elevation, feet MSL	Depth, feet	SAMPLES Type	SAMPLES Sample Time	SAMPLES pH	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	450					Fine sand.			1456	09/07/13
	455									
	460					SAA			1530	
	465									
	470					Becomes dark gray (10YR 4/1).			1658	
	475									
	480					SAA			1843	
	485									
	490					Becomes gary (10YR 5/1).			2030	
	495									
	500					Dark gray (10YR 4/1), silty fine SAND (SM).			2120	
	505									
	510					SAA			2230	
	515									
	520					SAA			0000	09/08/13
	525									
	530					SAA			0230	
	535									
	540					Becomes gray (10YR 5/1).			0330	
	545									
	550					SAA			0430	
	555									
	560					Gray (10YR 5/1), silt (ML).			0650	
	565									

Project: City of Torrance - Department of Public Works
Project Location: 185th St. West of Van Ness Avenue
Project Number: 29869072

Log of Boring Pilot Boring #12

Sheet 6 of 7

Elevation, feet MSL	Depth, feet	SAMPLES: Type	SAMPLES: Sample Time	SAMPLES: pH	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
	570					SAA			0750	09/08/13
	575									
	580					Becomes dark gray (10YR 4/1).			0848	
	585									
	590					SAA			0945	
	595									
	600					SAA			1045	
	605									
	610					Becomes gray (10YR 5/1), decrease fines content.			1131	
	615									
	620					Becomes dark gray (10YR 4/1).			1200	
	625									
	630					Dark gray (10YR 4/1), silty fine SAND (SM).			1315	
	635									
	640					Decrease fines content, fine to coarse SAND			1400	
	645									
	650					Gray (10YR 4/1), fine to medium SAND (SP), trace silt.			1502	
	655									
	660					Becomes medium to coarse SAND.			1531	Zone Test # 1 660 Ft to 680 Ft (9.2 gpm/ft)
	665									
	670					Becomes medium SAND.			1624	
	675									
	680					Becomes medium to coarse SAND.			1707	

Project: City of Torrance - Department of Public Works
Project Location: 185th St. West of Van Ness Avenue
Project Number: 29869072

Log of Boring Pilot Boring #12

Sheet 7 of 7

Elevation, feet MSL / Depth, feet	SAMPLES: Type	SAMPLES: Sample Time	SAMPLES: pH	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	Fluid Viscosity (seconds)	Sample Time	REMARKS
685									09/08/13
690					Contains fine gravel			1830	
695									
700					Becomes fine to medium SAND, trace gravel.			1930	
705									
710					No gravel.			2045	
715									
720					Becomes fine SAND.			2215	
725									
730					Gray (10YR 4/1), clayey fine gravel, SAND (SC).			2250	
735									
740					Gray (10YR 4/1), fine SAND (SP).			2325	
745									
750					Gray (10YR 4/1), clayey fine sand (SC).			0010	09/09/13
755									
760					Gray (10YR 4/1), CLAY (CL).			0105	
765									
770					SAA			0128	
775					Total Depth: 773 Ft bgs.				
780									
785									
790									
795									
800									

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ATTACHMENT B

Geophysical Log by Pacific Surveys, Inc.

PACIFIC SURVEYS

ELECTRIC LOG
LATEROLOG 3
GAMMA-RAY

Job No.		
17651	Company	SOUTH WEST PUMP & DRILLING
	Well	WELL #12
File No.	Field	TORRANCE
	County	LOS ANGELES State CA

Location:
18413 PURCHE AVE.
GPS: N33o 51.82134' W118o 19.22916'

Other Services:
GR/LL3
SONIC/VDL

Sec. Twp. Rge.

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

Date	09-09-2013
Run Number	ONE
Depth Driller	773'
Depth Logger	774.3
Bottom Logged Interval	774'
Top Log Interval	50'
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	PIT
Rm @ Meas. Temp	7.75 @ 77F
Rmf @ Meas. Temp	7.75 @ 77F
Rmc @ Meas. Temp	N/A
Source of Rmf / Rmc	MEAS
Rm @ BHT	N/A
Time Circulation Stopped	3 HRS
Time Logger on Bottom	06:15
Max. Recorded Temperature	N/A
Equipment Number	PS-7
Location	LA
Recorded By	RIDDER
Witnessed By	N. MONTOY

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Comments

Calibration Report

Database File	17651.db
Dataset Pathname	Elog.1
Dataset Creation	Mon Sep 09 06:55:09 2013

ELOG Calibration Report

Serial:	D4
Model:	DTQ
Shop Calibration Performed:	Fri Oct 19 10:46:05 2012
Before Survey Verification Performed:	Fri Oct 19 10:41:51 2012
After Survey Verification Performed:	Thu Oct 18 11:57:06 2012

Shop Calibration

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	9.537	101.083		10.200	102.200	Ohm-m	1.005	0.616
Long	8.898	98.443		10.200	102.200	Ohm-m	1.027	-17.000
IEE			counts			A		
VSN			counts			V		
VLN			counts			V		

Before Survey Verification

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	178.827	100.801		295.888	100.783	Ohm-m	2.501	-151.272
Long	934.011	103.172		103.094	103.094	Ohm-m	0.483	53.212
IEE			counts			A		
VSN			counts			V		
VLN			counts			V		

After Survey Verification

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	40.270	101.200		40.249	101.201	Ohm-m	1.000	-0.035
Long	142.491	102.843		102.842	102.842	Ohm-m	1.004	-0.383
IEE			counts			A		
VSN			counts			V		
VLN			counts			V		

After Survey Verification compared to Before Survey Calibration

	Zero Before	Zero After		Cal Before	Cal After	
Short	295.888	40.249	Ohm-m	100.783	101.201	Ohm-m
Long	504.790	142.638	Ohm-m	103.094	102.842	Ohm-m

Gamma Ray Calibration Report

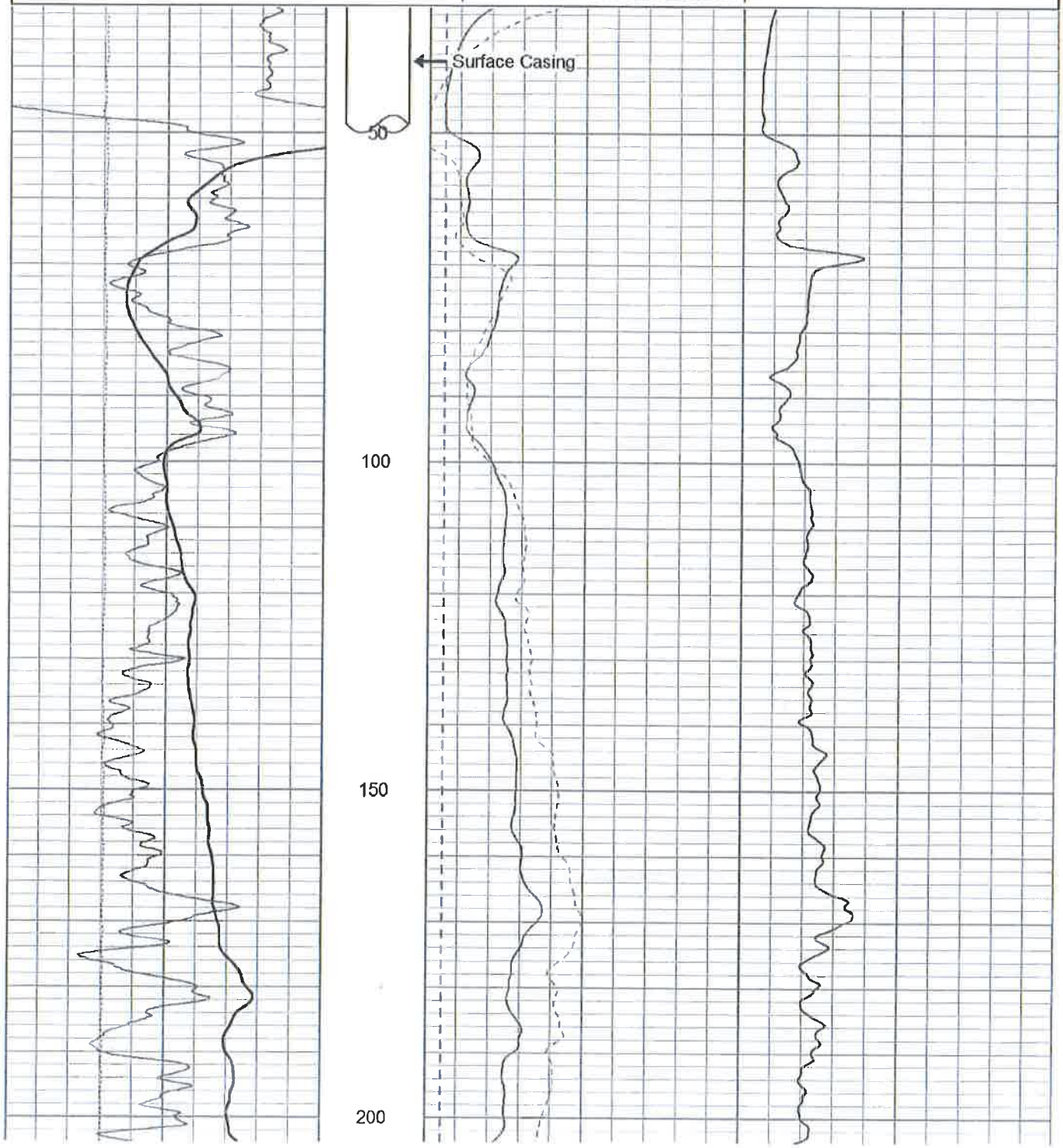
Serial Number:	D4	
Tool Model:	ELOG	
Performed:	Thu Oct 18 11:57:13 2012	
Calibrator Value:	162.0	GAPI
Background Reading:	173.2	cps
Calibrator Reading:	678.3	cps
Sensitivity:	0.3207	GAPI/cps

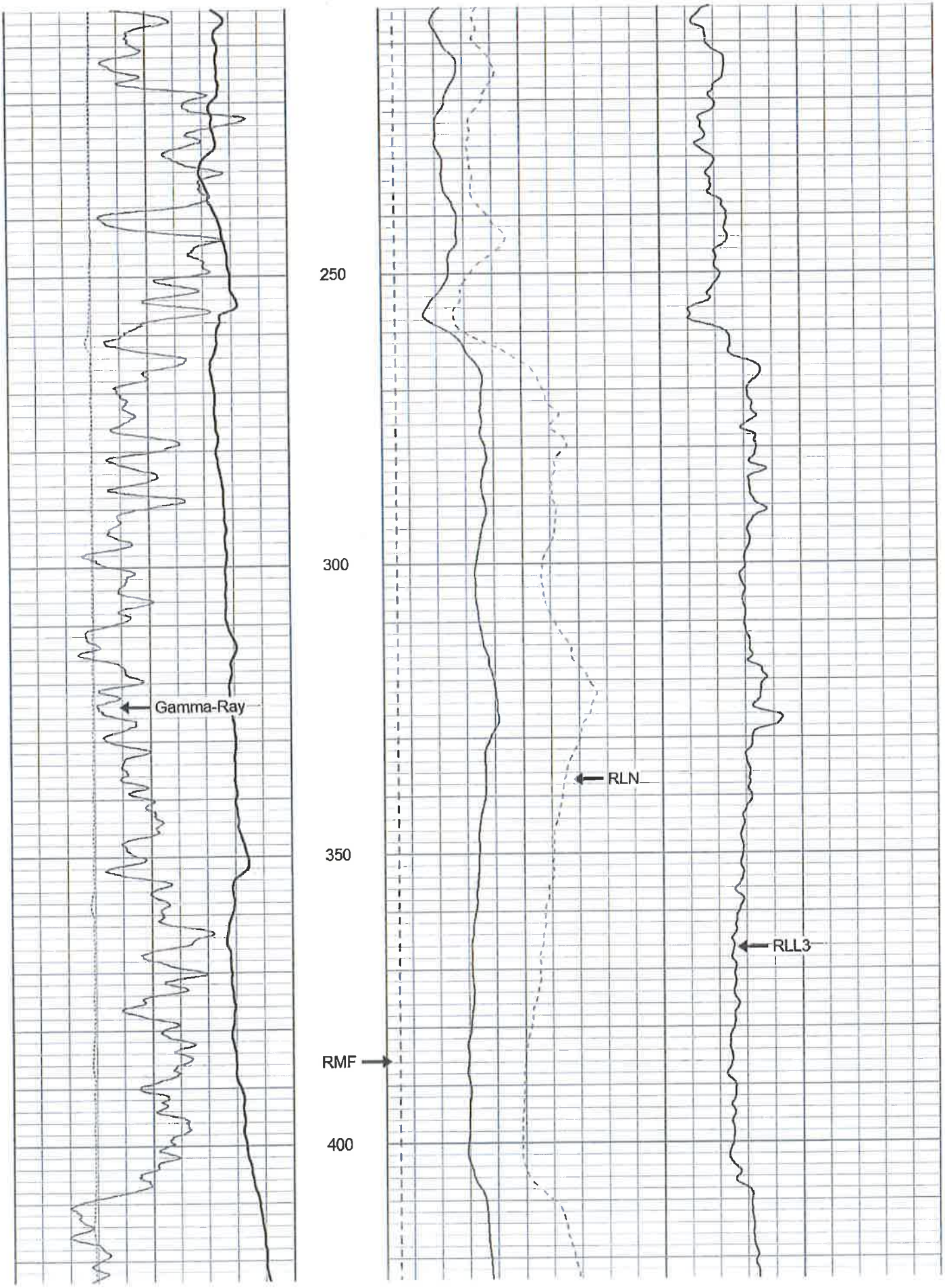
Database File	17651.db
Dataset Pathname	Elog.1
Presentation Format	elog
Dataset Creation	Mon Sep 09 06:55:09 2013
Charted by	Depth in Feet scaled 1:240

-40	SP (mV)	60
0	Line Speed (ft/min)	-100
30	Gamma-Ray (GAPI)	80

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
150	*RLL3 back-up (Ohm-m)*	1500

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350
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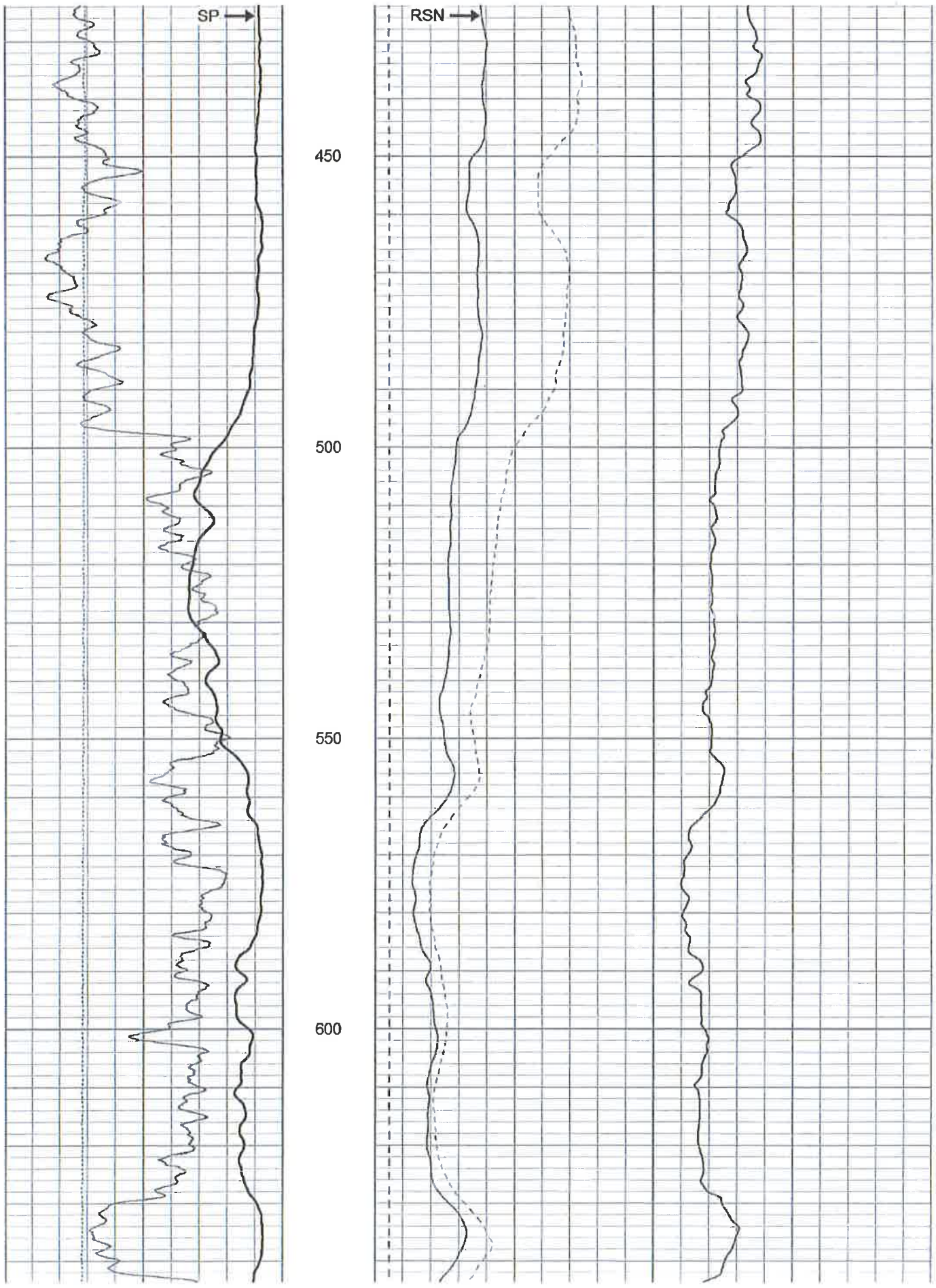
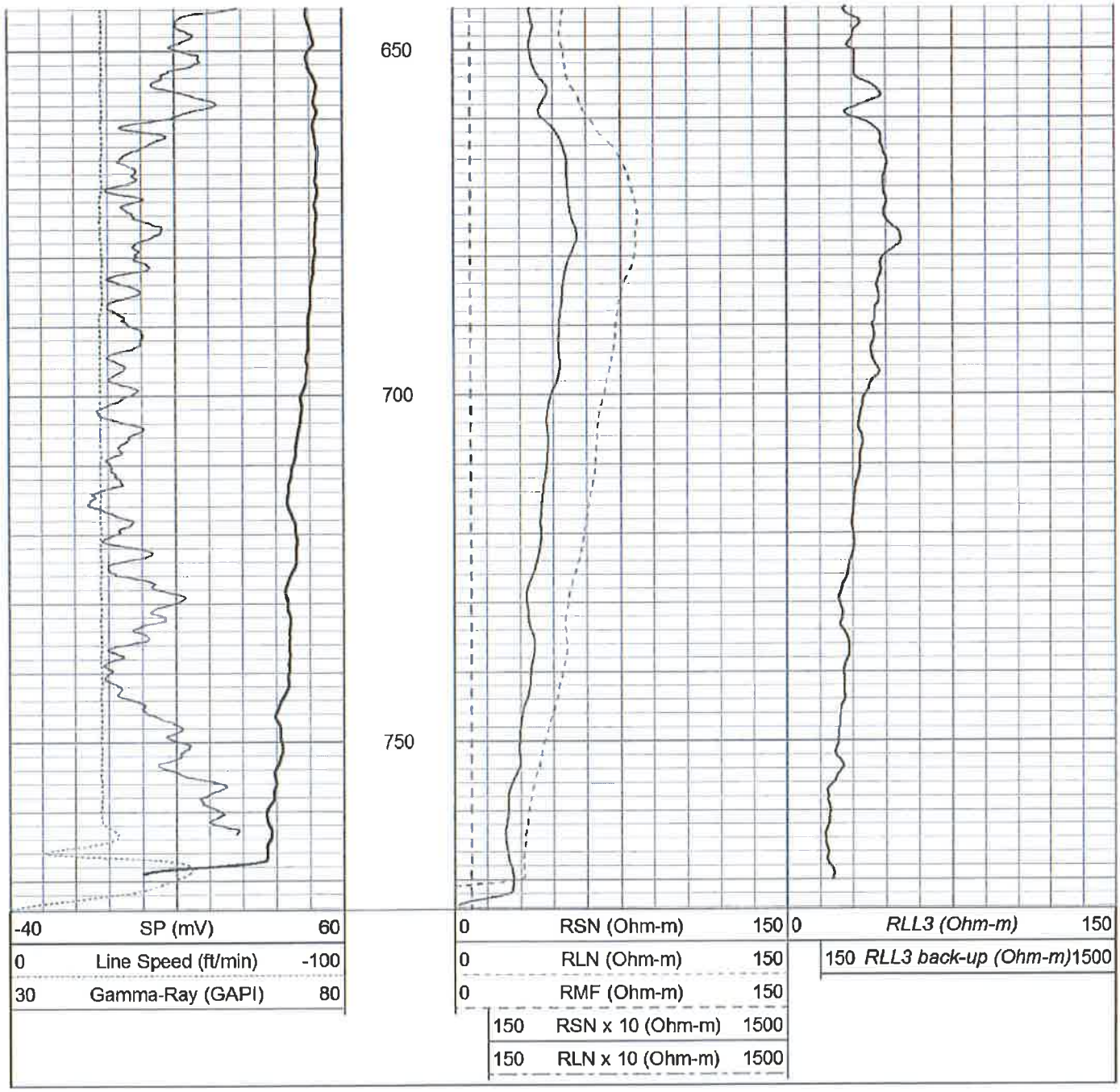
Gamma-Ray
RLN
RLL3
RMF


SP
RSN
450
500
550
600


650
700
750
-40 SP (mV) 60
0 Line Speed (ft/min) -100
30 Gamma-Ray (GAPI) 80
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
150 RLL3 back-up (Ohm-m) 1500

PACIFIC SURVEYS

LATEROLOG 3
GAMMA-RAY

Job No. 17651

File No.

Company SOUTH WEST PUMP & DRILLING

Well WELL #12

Field TORRANCE

County LOS ANGELES State CA

Location:

18413 PURCHE AVE.
GPS: N33o 51.82134' W118o 19.22916'

Other Services:

ELOG
SONIC/VDL

Sec. Twp. Rge.

Permanent Datum	G.L.	0'	Elevation above perm. datum	K.B.	Elevation
Log Measured From	G.L.			D.F.	
Drilling Measured From	G.L.			G.L.	
Date		09-09-2013			
Run Number		ONE			
Depth Driller		773'			
Depth Logger		774.3			
Bottom Logged Interval		774'			
Top Log Interval		50'			
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		PIT			
Rm @ Meas. Temp		7.75 @ 77F			
Rmf @ Meas. Temp		7.75 @ 77F			
Rmc @ Meas. Temp		N/A			
Source of Rmf / Rmc		MEAS			
Rm @ BHT		N/A			
Time Circulation Stopped		3 HRS			
Time Logger on Bottom		06:15			
Max. Recorded Temperature		N/A			
Equipment Number		PS-7			
Location		LA			
Recorded By		RIDDER			
Witnessed By		N. MONTOY			

<<< Fold Here >>>

Comments

Calibration Report

Database File	17651.db
Dataset Pathname	LL3_2
Dataset Creation	Mon Sep 09 07:51:46 2013

Gamma Ray Calibration Report

Serial Number:	12	
Tool Model:	GROH	
Performed:	Fri Apr 15 07:10:16 2011	
Calibrator Value:	162.0	GAPI
Background Reading:	43.7	
Calibrator Reading:	168.2	
Sensitivity:	1.3020	GAPI/

RLL3 (Resistivity Laterolog 3) Calibration Report:

Serial Number:	883
Tool Model:	M&W
Performed:	Fri Oct 19 11:07:08 2012

System Reading	Calibration Reference	
0.014	2.500	Ohm-m
0.027	5.000	
0.254	50.000	
1.169	250.000	
2.121	500.000	

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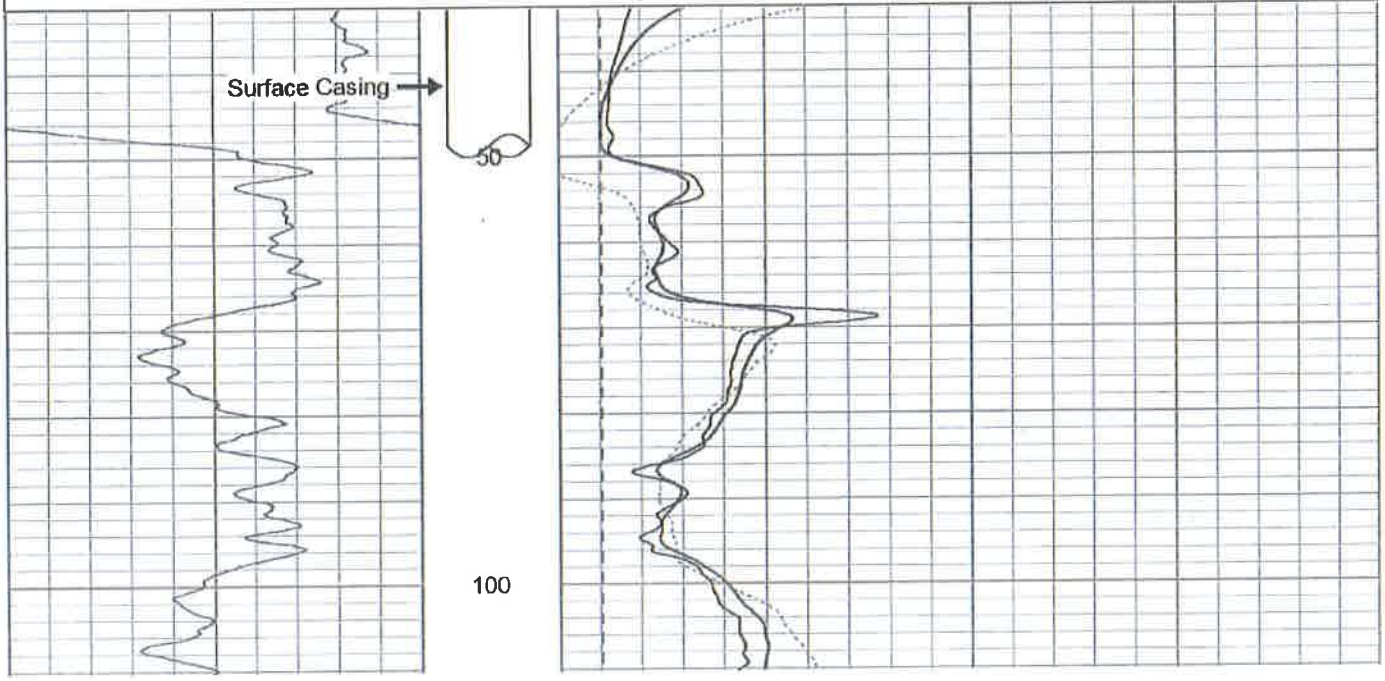
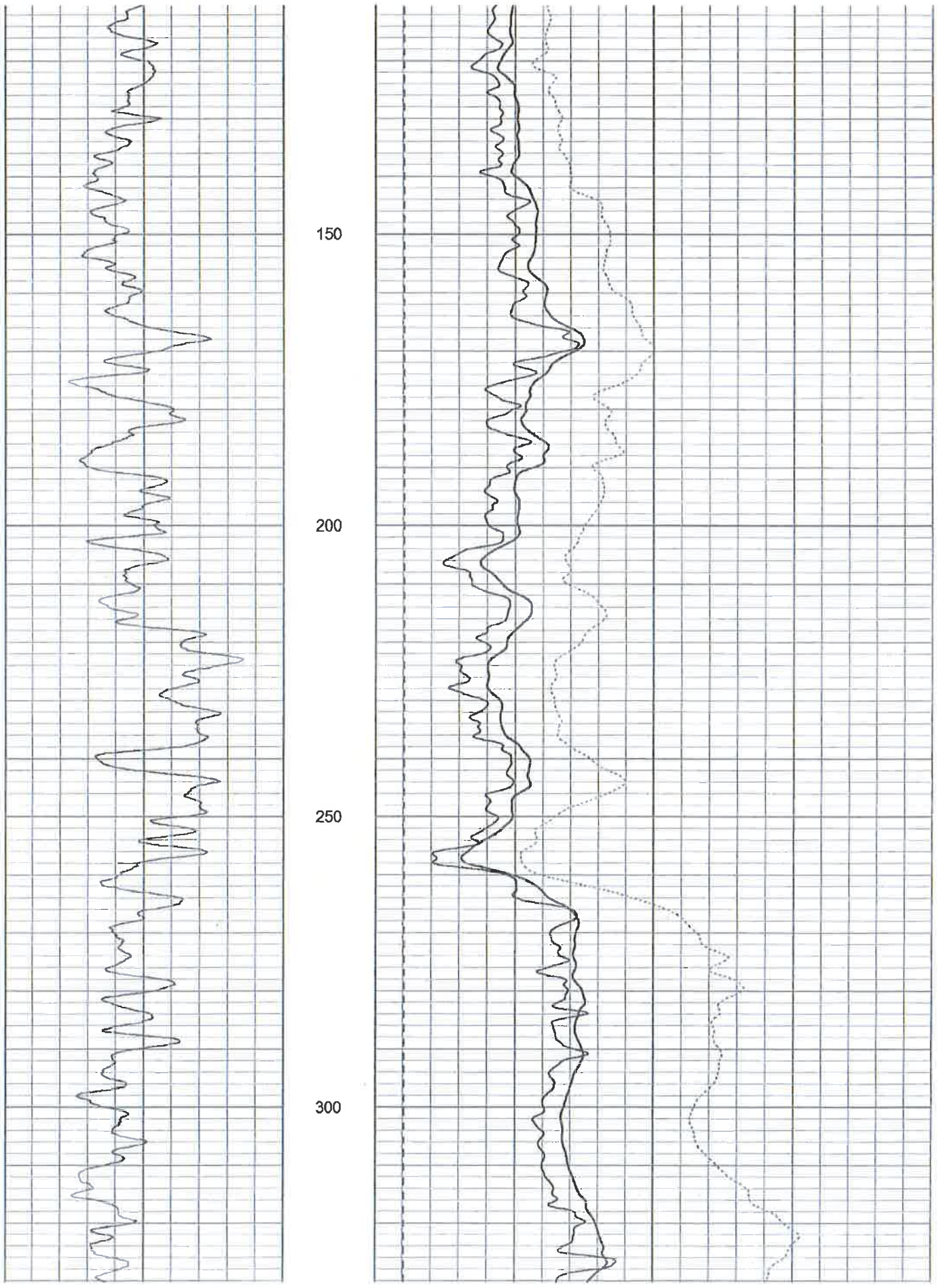
Dataset Pathname	LL3_2
Presentation Format	guard
Dataset Creation	Mon Sep 09 07:51:46 2013
Charted by	Depth in Feet scaled 1:240

30	Gamma-Ray (GAPI)	80

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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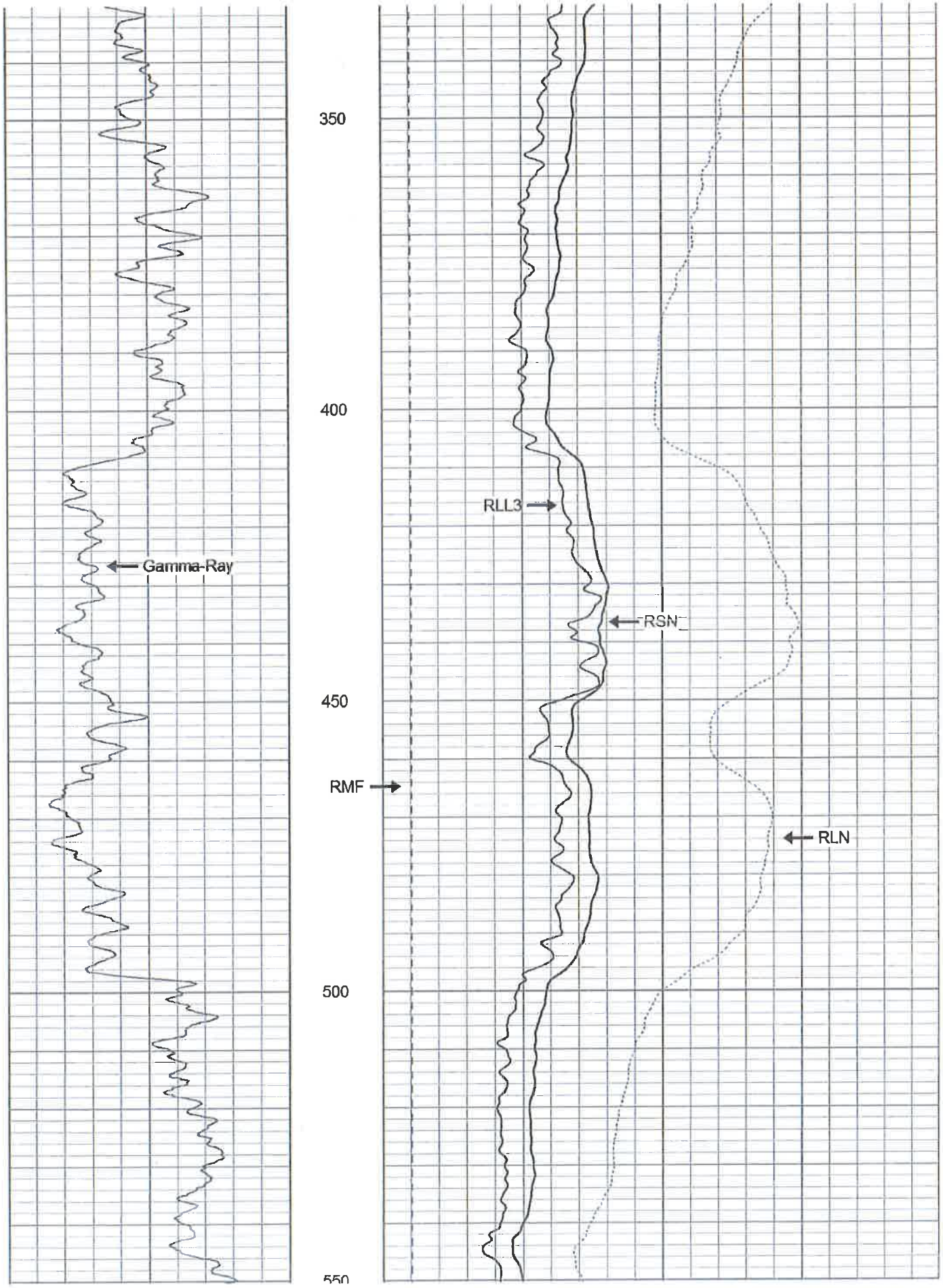
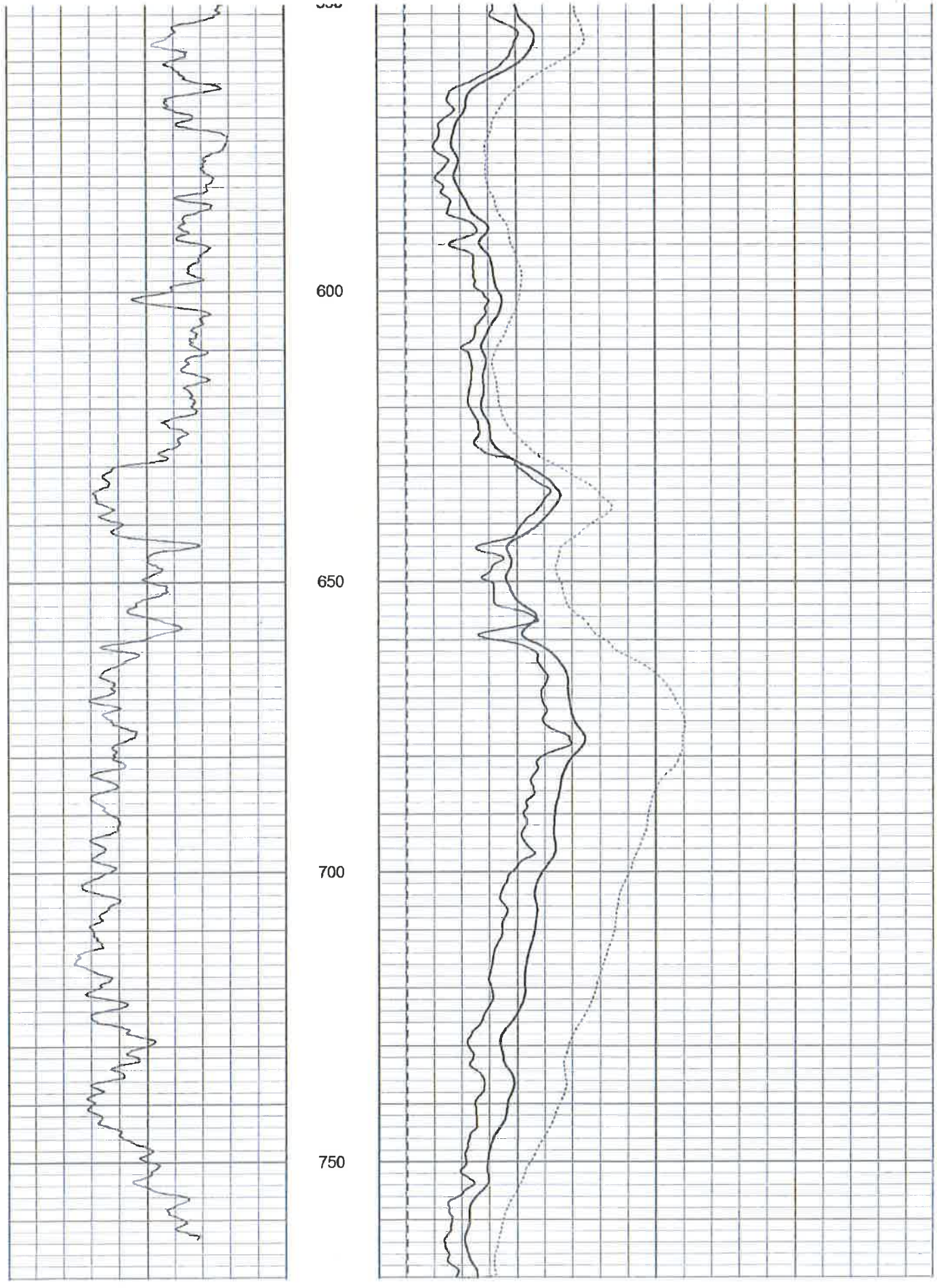
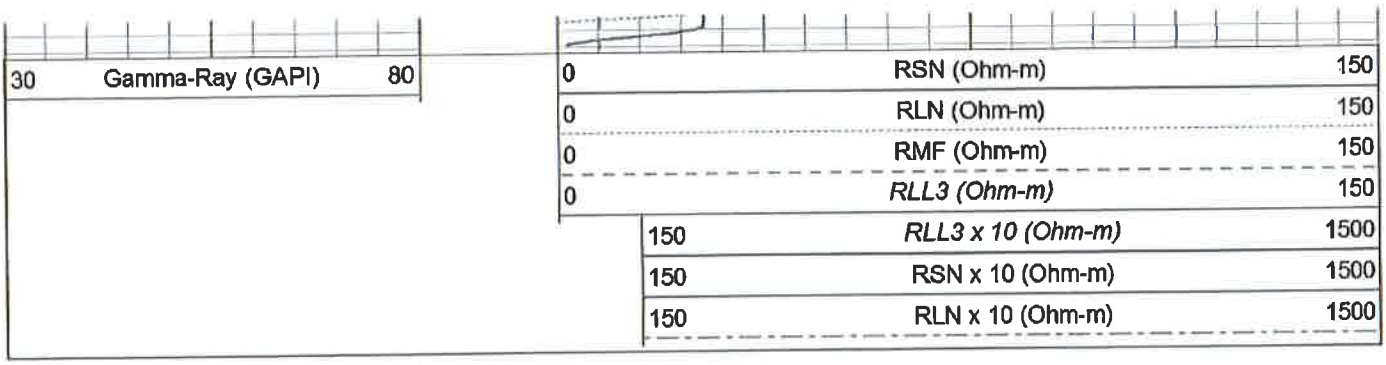
200
250
300


350
400
450
500
550
Gamma-Ray
RLL3
RSN
RMF
RLN


600
650
700
750


30 Gamma-Ray (GAPI) 80
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.	Company	SOUTH WEST PUMP & DRILLING
17651	Well	WELL #12
File No.	Field	TORRANCE
	County	LOS ANGELES
	State	CA

Location:

18413 PURCHE AVE.
GPS: N33o 51.82134' W118o 19.22916'

Other Services:

ELOG
GR/LL3

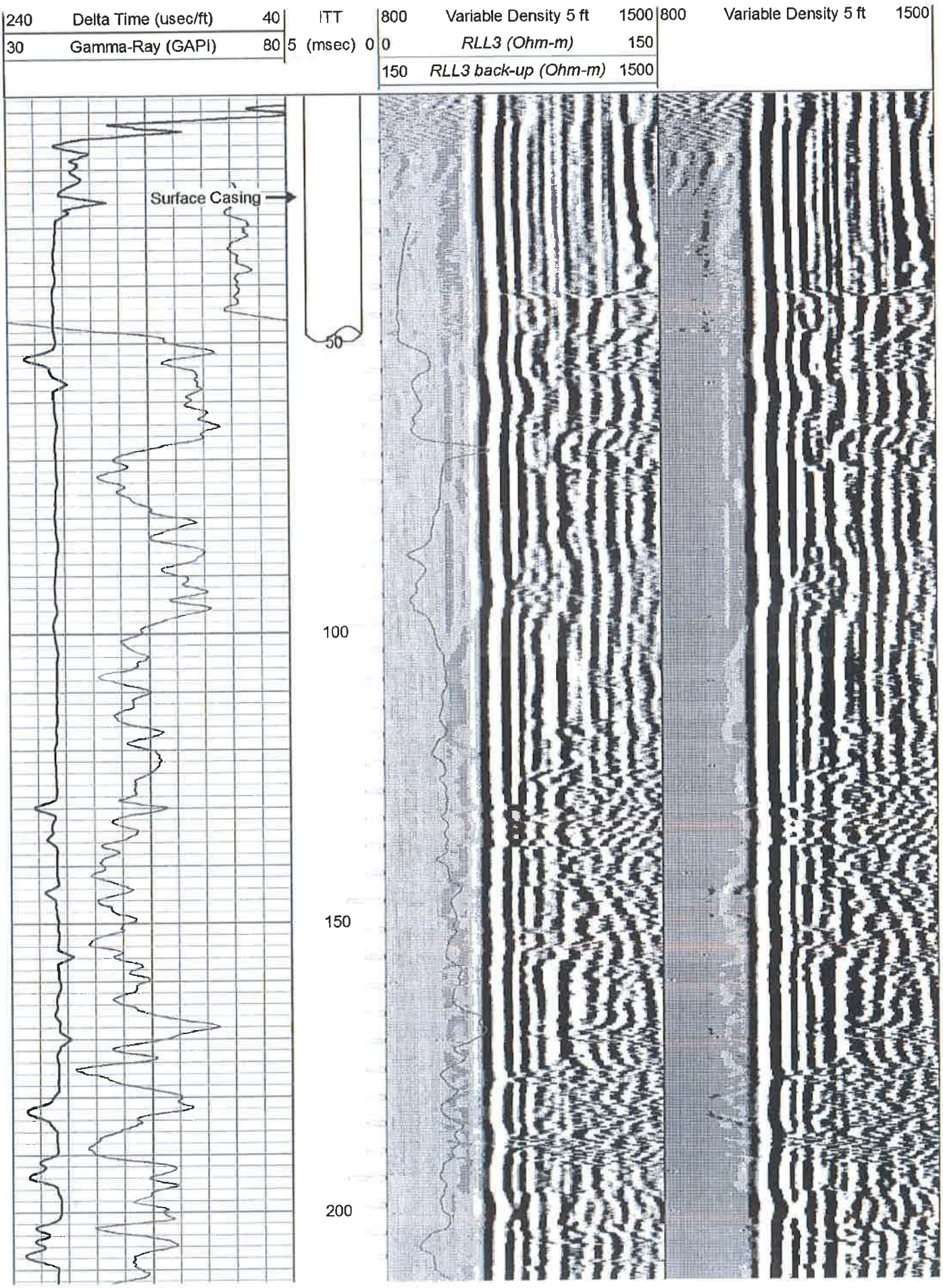
Sec.	Twp.	Rge.	Elevation	
Permanent Datum	G.L.		Elevation above perm. datum	K.B.
Log Measured From	G.L.	0'		D.F.
Drilling Measured From	G.L.			G.L.

Date	09-09-2013			
Run Number	ONE			
Depth Driller	773'			
Depth Logger	774.3			
Bottom Logged Interval	774'			
Top Log Interval	50'			
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	PIT			
Rm @ Meas. Temp	7.75 @ 77F			
Rmf @ Meas. Temp	7.75 @ 77F			
Rmc @ Meas. Temp	N/A			
Source of Rmf / Rmc	MEAS			
Rm @ BHT	N/A			
Time Circulation Stopped	3 HRS			
Time Logger on Bottom	06:15			
Max. Recorded Temperature	N/A			
Equipment Number	PS-7			
Location	LA			
Recorded By	RIDDER			
Witnessed By	N. MONTOY			

<<< Fold Here >>>

Comments

Database File	17651.db
Dataset Pathname	SONIC2
Presentation Format	sonic_ps
Dataset Creation	Mon Sep 09 09:00:10 2013
Charted by	Depth in Feet scaled 1:240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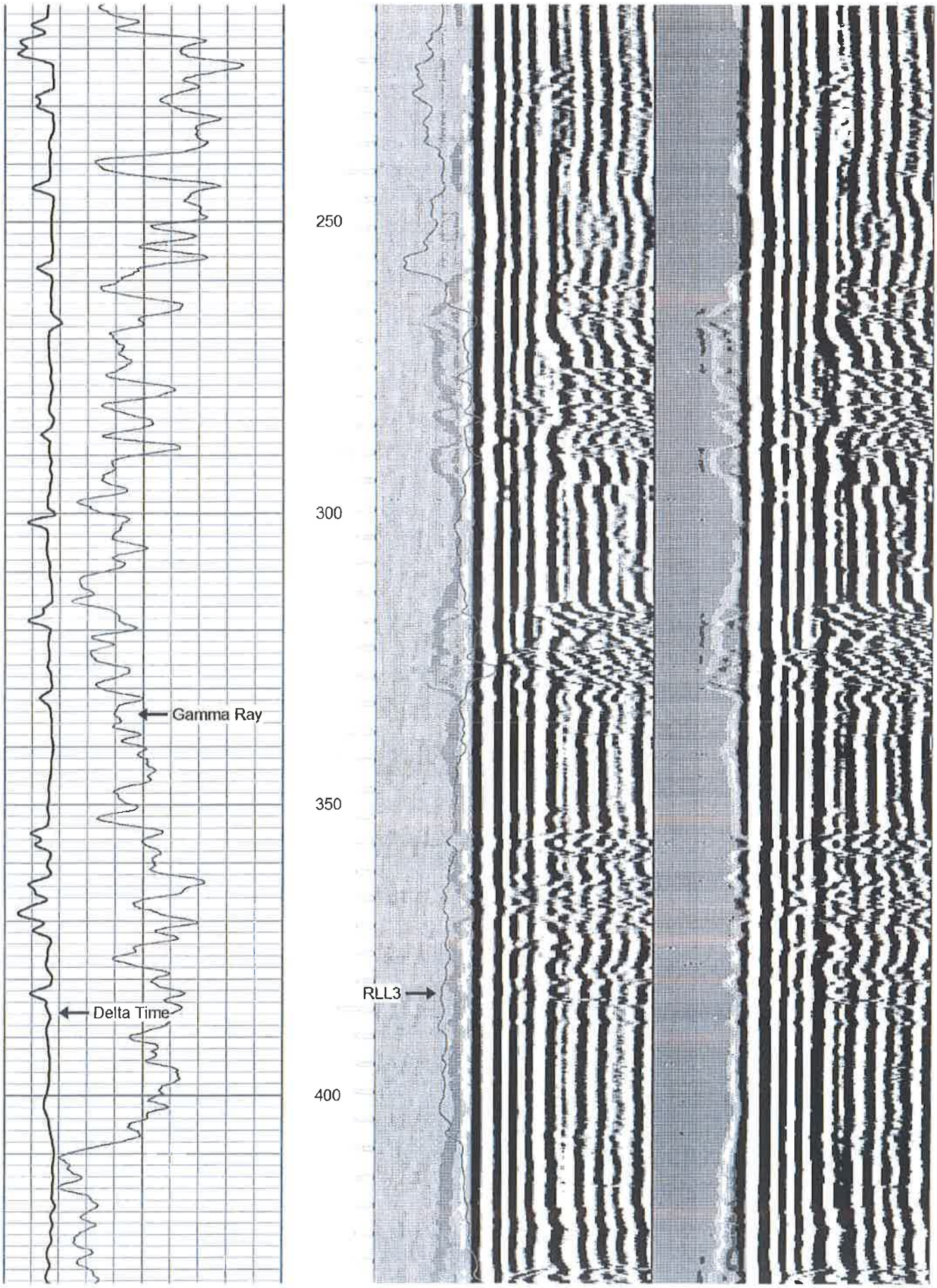
30 Gamma-Ray (GAPI) 80
ITT
5 (msec) 0
800 Variable Density 5 ft 1500
0 RLL3 (Ohm-m) 150
150 RLL3 back-up (Ohm-m) 1500
800 Variable Density 5 ft 1500
Surface Casing
50
100
150
200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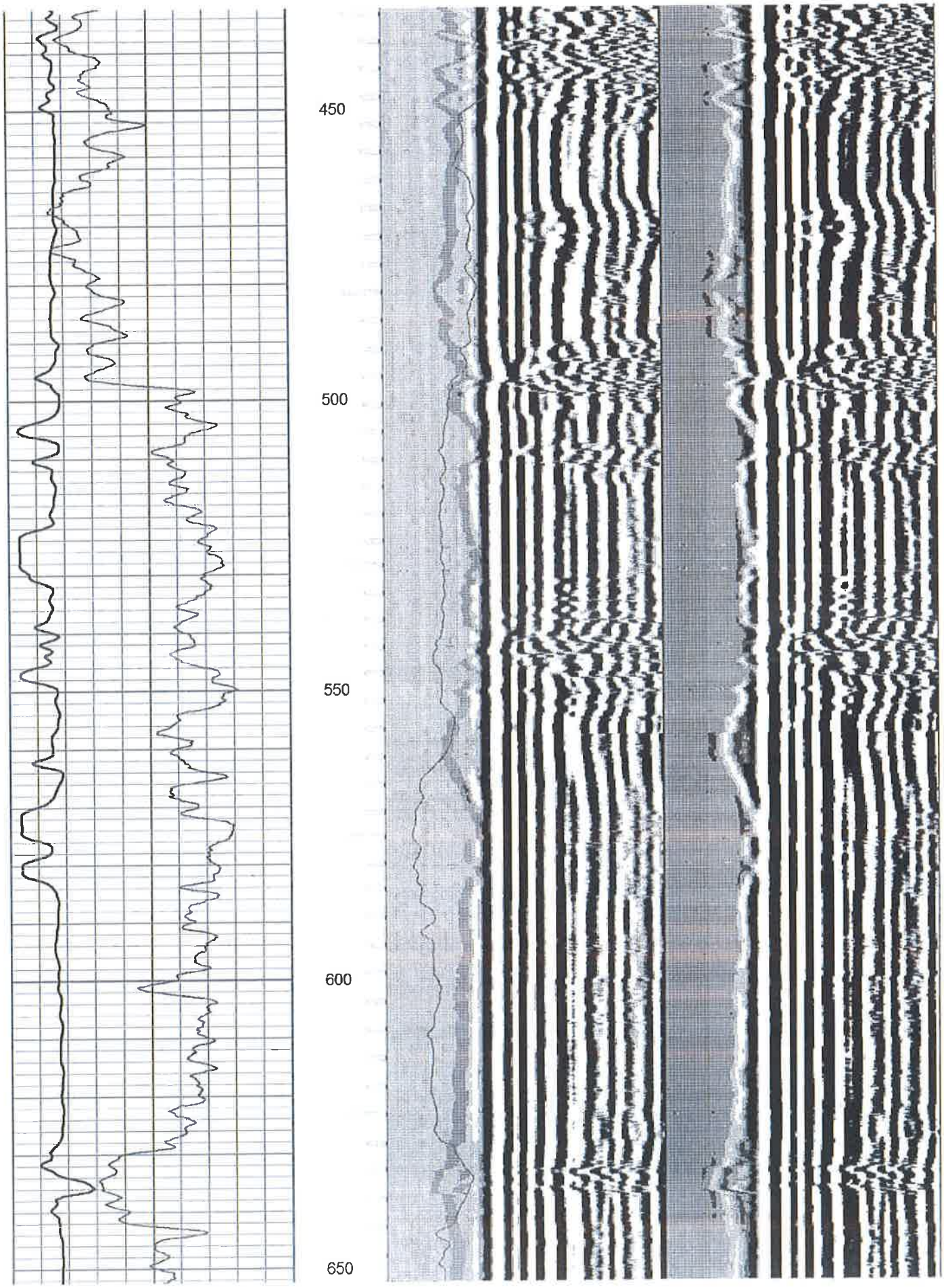
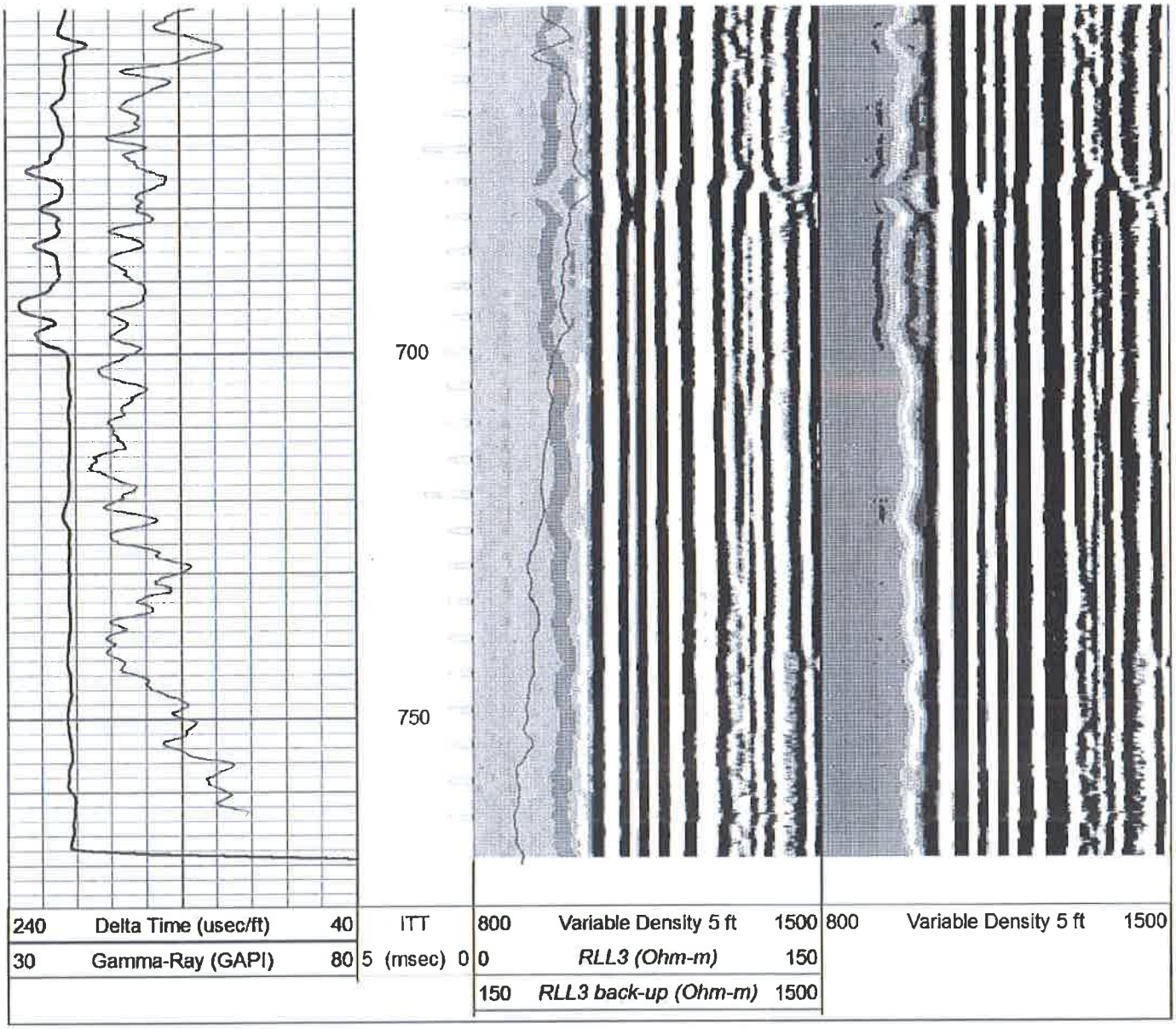
300
350
400
Gamma Ray
Delta Time
RLL3

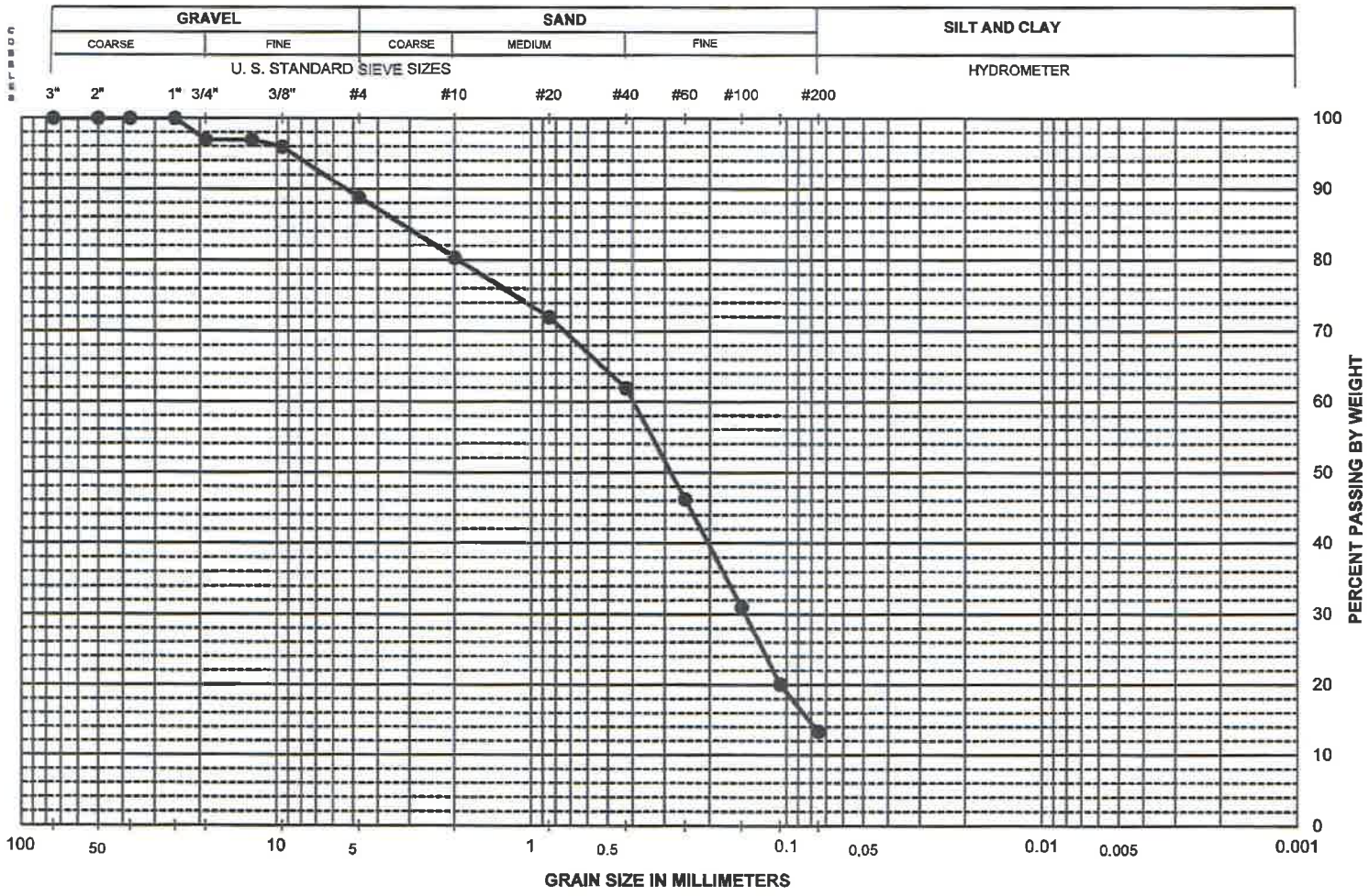

450
500
550
600
650


700
750
240 Delta Time (usec/ft) 40
30 Gamma-Ray (GAPI) 80
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

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	96.9
1/2"	12.50	96.9
3/8"	9.50	95.9
#4	4.75	88.8
#10	2.00	80.3
#20	0.850	72.0
#40	0.425	61.9
#60	0.250	46.2
#100	0.150	31.0
#140	0.106	20.1
#200	0.075	13.3
Hydrometer Analysis		

% Cobbles	—
% Gravel	11.2
% Sand	75.5
% Fines	13.3
D_{85}	3.227
D_{60}	0.399
D_{50}	0.284
D_{30}	0.145
D_{15}	0.082
D_{10}	—
C_u	—
C_c	—

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 µm	Description and Classification
Well 12		180 ~ 190	•	NA	—	—	—	Gray silty Sand (SM)

PROJECT NAME: City of Torrance

PROJECT NUMBER: 29869072

PARTICLE-SIZE DISTRIBUTION CURVES

T:\2013\City of Torrance\Deliverables\02. #12\XX. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 12 0180

URS

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

Project Number: 29869072 Task Number: 00005 Boring No.: Well 12
Project Name: City of Torrance Sample No.:
Project Engineer: BP Depth (ft): 180 ~ 190
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)
Selection Method: c
(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		f110	f110	Dry, M2 (g)	XXX
Mass of Container and Dry Soil, (g)		485.1	438.37	Cont.,M3 (g)	XXX
Mass of Container, (g)		109.51	109.57	Water Content (%)	NA
Dry Soil, Ws (g)		375.59	328.8		

% error: 0.12

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
[x] 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 "	0		100
	3/4 "	11.81		96.9
	1/2 "	11.81		96.9
See (4)	3/8 "	15.28		95.9
	#4	41.89		88.8
325	#10	73.87		80.3
180	#20	105.18		72
115	#40	142.92		61.9
75	#60	202.13		46.2
60	#100	259.3		31
40	#140*	300.1		20.1
30	#200	325.5		13.3
20	Pan	328.4	XXXXXXXX	XXXXXXXXX

SUMMARY: Shape & Filter Parameters

% COBBLES	---	D60	0.399	D85	3.23
% GRAVEL	11.2	D30	0.145	D50	0.28
% SAND	75.5	D10	---	D15	0.08
% FINES	13.3	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:

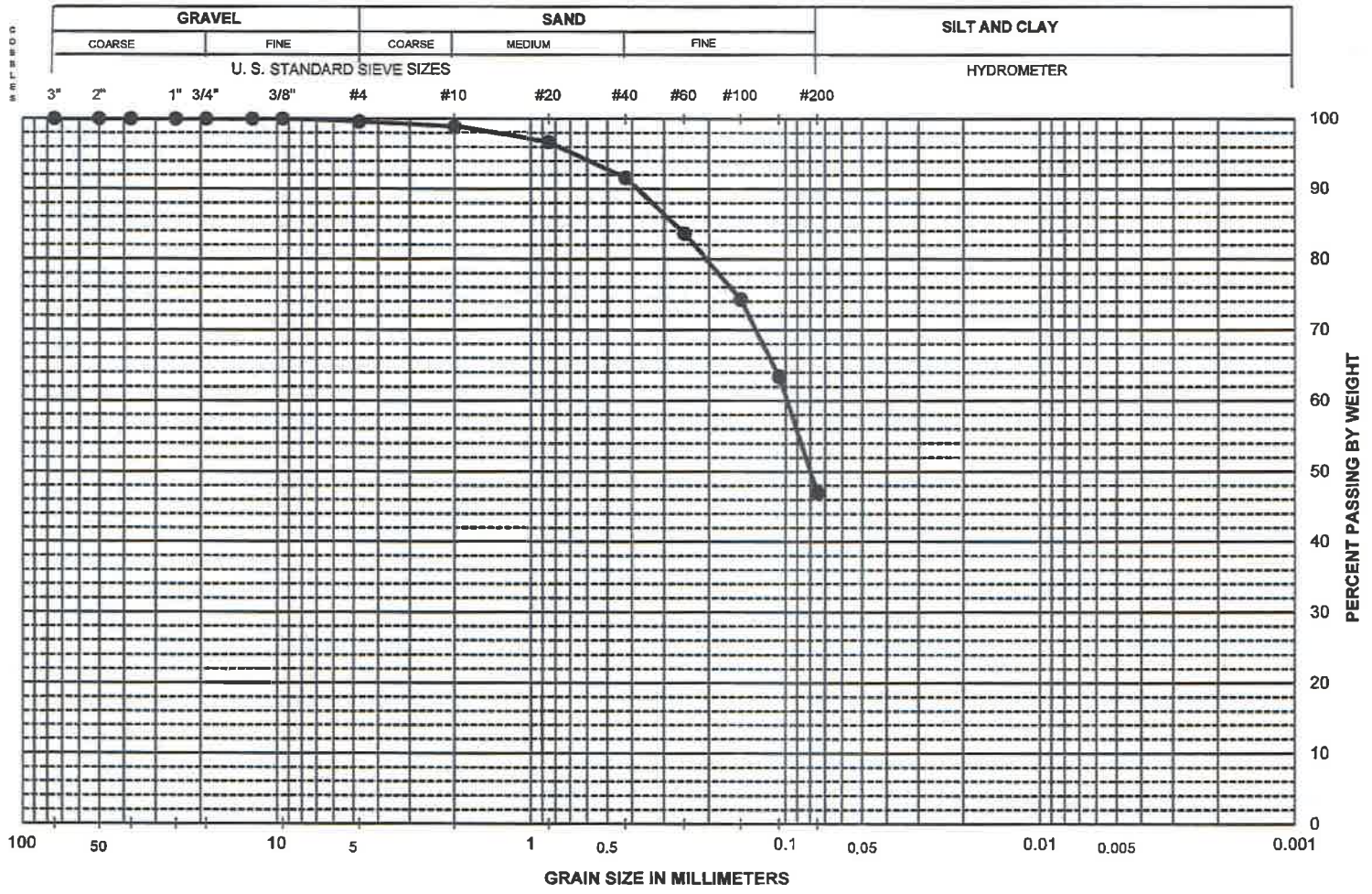
Particle Hardness
[x] Hard [ ] Soft [ ] Weathered

CALCULATED BY: LV

SET-UP BY: TJO DATE 09/18/13 CHECKED BY: TJO SUBMITTED BY:

T:\2013\City of Torrance\Deliverables\02. #12\XX. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 12 0180 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	99.6
#10	2.00	98.9
#20	0.850	96.7
#40	0.425	91.6
#60	0.250	83.6
#100	0.150	74.3
#140	0.106	63.4
#200	0.075	47.0

Hydrometer Analysis

% Cobbles	—
% Gravel	0.4
% Sand	52.6
% Fines	47.0
D_{85}	0.274
D_{60}	0.099
D_{50}	0.080
D_{30}	#N/A
D_{15}	#N/A
D_{10}	—
C_u	—
C_c	—

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 µm	Description and Classification
Well 12		400 ~ 410	●	NA	—	—	—	**Gray silty Sand (SM)**

PROJECT NAME: **City of Torrance**

PROJECT NUMBER: **29869072**

PARTICLE-SIZE DISTRIBUTION CURVES

T:\2013\City of Torrance\Deliverables\02. #12\XX. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 12 0400

URS

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

ASTM D422, ASTM D6913 and D2216

Project Number: 29869072 Task Number: 00005 Boring No.: Well 12

Project Name: City of Torrance Sample No.:

Project Engineer: BP Depth (ft): 400 ~ 410

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		m71	m71	Dry, M2 (g)	XXX
Mass of Container and Dry Soil, (g)		474.74	323.5	Cont.,M3 (g)	XXX
Mass of Container, (g)		109.3	109.41	Water Content (%)	NA
Dry Soil, Ws (g)		365.44	214.09		

SIEVING RESULTS % error: 0.18

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
x	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
	#4	1.3		99.6
	#10	3.9		98.9
	#20	12.1		96.7
	#40	30.7		91.6
	#60	60		83.6
	#100	94		74.3
	#140*	133.6		63.4
	#200	193.7		47
	Pan	213.7	XXXXXXXX	XXXXXXXXX

SUMMARY: Shape & Filter Parameters

% COBBLES	—	D60	0.099	D85	0.27
% GRAVEL	0.4	D30	---	D50	0.08
% SAND	52.6	D10	—	D15	---
% FINES	47.0	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: _____

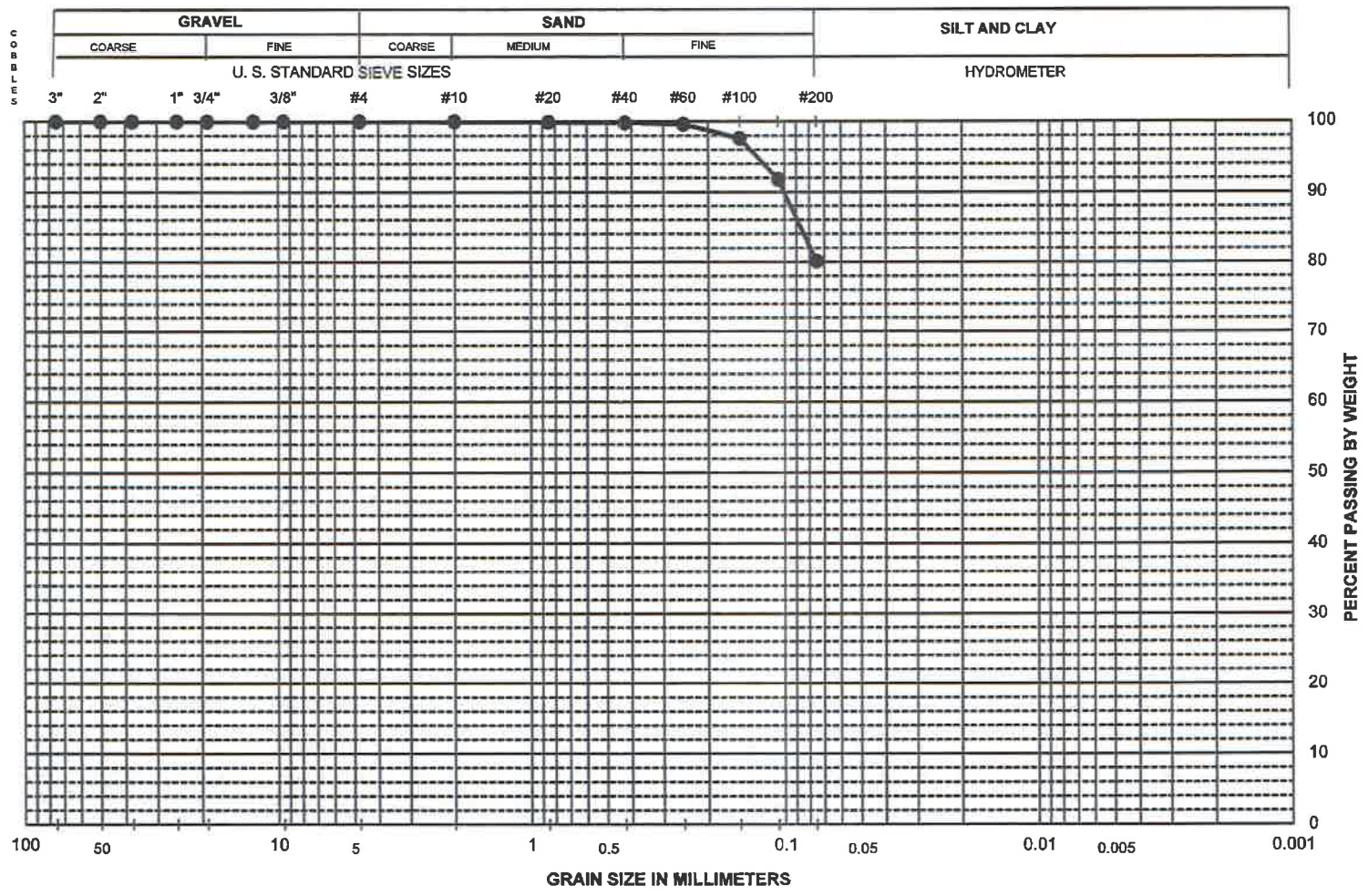
Particle Hardness x Hard [ ] Soft [ ] Weathered

CALCULATED BY: LV

SET-UP BY: TJO DATE 09/18/13 CHECKED BY: TJO SUBMITTED BY: _____

T:\2013\City of Torrance\Deliverables\02. #12\XX. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 12 0400 **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	100.0
#20	0.850	99.9
#40	0.425	99.8
#60	0.250	99.6
#100	0.150	97.6
#140	0.106	91.8
#200	0.075	80.1
Hydrometer Analysis		

% Cobbles	—
% Gravel	0.0
% Sand	19.9
% Fines	80.1
D_{85}	0.087
D_{60}	—
D_{50}	—
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 12		520 ~ 530	●	NA	—	—	—	**Gray Silt with sand (ML)**

PROJECT NAME: **City of Torrance**

PROJECT NUMBER: **29869072**

PARTICLE-SIZE DISTRIBUTION CURVES

T:\2013\City of Torrance\Deliverables\02. #12\XX. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 12 0520

URS

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

Project Number: 29869072 Task Number: 00005 Boring No.: Well 12
Project Name: City of Torrance Sample No.:
Project Engineer: BP Depth (ft): 520 ~ 530
Visual Description: Gray Silt with sand (ML)

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)
Selection Method: c
(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		m70	m70	Dry, M2 (g)	XXX
Mass of Container and Dry Soil, (g)		343.11	166.3	Cont.,M3 (g)	XXX
Mass of Container, (g)		105.5	105.5	Water Content (%)	NA
Dry Soil, Ws (g)		237.61	60.8		

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
x	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 "			
	3/8 "			
325	#4	0		100
180	#10	0		100
115	#20	0.2		99.9
75	#40	0.5		99.8
60	#60	1		99.6
40	#100	5.7		97.6
30	#140*	19.6		91.8
20	#200	47.3		80.1
	Pan	60.9	XXXXXXXX	XXXXXXXXXX

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

SUMMARY: Shape & Filter Parameters

% COBBLES	---	D60	---	D85	0.09
% GRAVEL	0.0	D30	---	D50	---
% SAND	19.9	D10	---	D15	---
% FINES	80.1	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.

Mica Noted: x No [ ] Yes Amount Adjective:

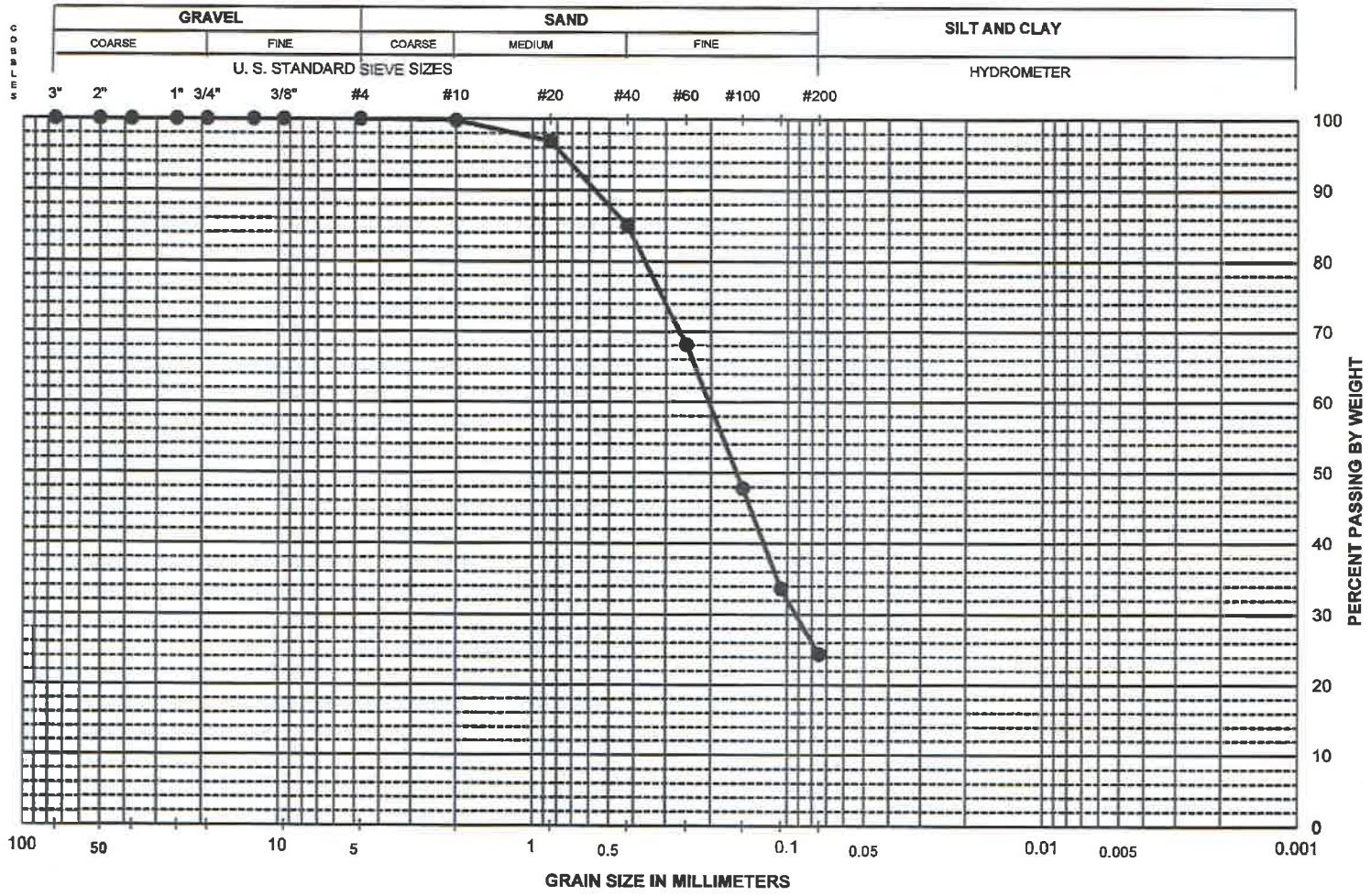
Particle Hardness
x Hard [ ] Soft [ ] Weathered

CALCULATED BY: LV

SET-UP BY: TJO DATE 09/18/13 CHECKED BY: TJO SUBMITTED BY:

T:\2013\City of Torrance\Deliverables\02. #12\XX. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 12 0520 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	96.9
#40	0.425	85.0
#60	0.250	68.1
#100	0.150	47.8
#140	0.106	33.7
#200	0.075	24.4
Hydrometer Analysis		

% Cobbles	—
% Gravel	0.0
% Sand	75.6
% Fines	24.4
D_{85}	0.425
D_{60}	0.204
D_{50}	0.159
D_{30}	0.092
D_{15}	—
D_{10}	—
C_u	—
C_c	—

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 µm	Description and Classification
Well 12		640 ~ 650	●	NA	—	—	—	Gray silty Sand (SM)

PROJECT NAME: City of Torrance

PROJECT NUMBER: 29869072

PARTICLE-SIZE DISTRIBUTION CURVES

T:\2013\City of Torrance\Deliverables\02. #12\XX. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 12 0640

URS

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

Project Number: 29869072 Task Number: 00005 Boring No.: Well 12
Project Name: City of Torrance Sample No.:
Project Engineer: BP Depth (ft): 640 ~ 650
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		sx37	sx37	Dry, M2 (g)	XXX
Mass of Container and Dry Soil, (g)		538.93	442.6	Cont.,M3 (g)	XXX
Mass of Container, (g)		105.6	105.6	Water Content (%)	NA
Dry Soil, Ws (g)		433.33	337		

SIEVING RESULTS — % error: 0.09

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	0.8		99.8
	115		#20	13.4		96.9
	75		#40	64.8		85
**	60		#60	138.3		68.1
**	40		#100	226.2		47.8
**	30		#140*	287.3		33.7
**	20		#200	327.6		24.4
			Pan	336.7	XXXXXXXX	XXXXXXXXXX

SUMMARY: Shape & Filter Parameters

% COBBLES	---	D60	0.204	D85	0.43
% GRAVEL	0.0	D30	0.092	D50	0.16
% SAND	75.6	D10	---	D15	---
% FINES	24.4	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:

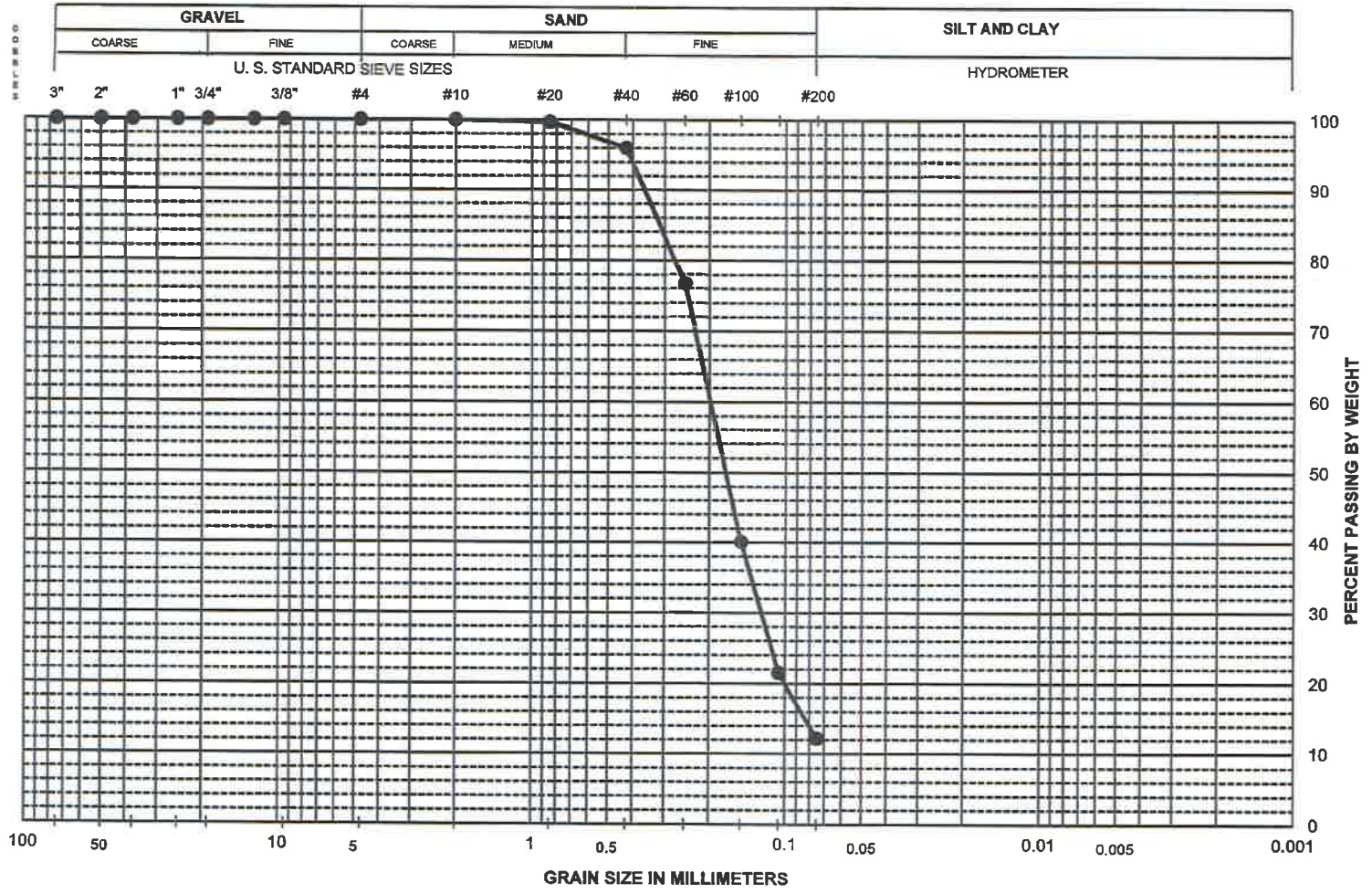
Particle Hardness
Hard Soft **Weathered**

CALCULATED BY: LV

SET-UP BY: TJO DATE 09/18/13 CHECKED BY: TJO SUBMITTED BY:

T:\2013\City of Torrance\Deliverables\02. #12\XX. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 12 0640 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	100.0
#20	0.850	99.7
#40	0.425	96.0
#60	0.250	76.7
#100	0.150	40.1
#140	0.106	21.5
#200	0.075	12.2
Hydrometer Analysis		

% Cobbles	—
% Gravel	0.0
% Sand	87.8
% Fines	12.2
D_{85}	0.314
D_{60}	0.198
D_{50}	0.172
D_{30}	0.124
D_{15}	0.083
D_{10}	—
C_u	—
C_c	—

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 μm	Description and Classification
Well 12		730 ~ 740	●	NA	—	—	—	Gray silty Sand (SM)

PROJECT NAME: City of Torrance

PROJECT NUMBER: 29869072

PARTICLE-SIZE DISTRIBUTION CURVES

T:\2013\City of Torrance\Deliverables\02. #12\XX. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 12 0730

URS

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

ASTM D422, ASTM D6913 and D2216

Project Number: 29869072 Task Number: 00005 Boring No.: Well 12

Project Name: City of Torrance Sample No.:

Project Engineer: BP Depth (ft): 730 ~ 740

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.

Water Content

MASS OF TEST SPECIMEN (g)	Total Test Specimen with Coarse Fraction	Partial or Whole Test Specimen	Soil Retained (after washing)	As Recieved or Container No.	
Min.sieve size in sieving sequence (3)	#N/A	# 200	+200	Wet, M1 (g)	
Container Number		sx32	sx32	Dry, M2 (g)	XXX
Mass of Container and Dry Soil, (g)		432.2	398.2	Cont.,M3 (g)	XXX
Mass of Container, (g)		106.9	106.9	**Water Content (%)**	**NA**
Dry Soil, Ws (g)		325.3	291.3		

SIEVING RESULTS % error: 0.21

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 "			
325	#4	0		100
180	#10	0		100
115	#20	0.9		99.7
75	#40	12.9		96
** 60	#60	75.7		76.7
** 40	#100	195		40.1
** 30	#140*	255.5		21.5
** 20	#200	285.6		12.2
	Pan	290.7	XXXXXXXX	XXXXXXXXXX

SUMMARY: Shape & Filter Parameters

% COBBLES	---	D60	0.198	D85	0.31
% GRAVEL	0.0	D30	0.124	D50	0.17
% SAND	87.8	D10	---	D15	0.08
% FINES	12.2	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 09/18/13 CHECKED BY: TJO SUBMITTED BY: Thomas J. O'Mara

T:\2013\City of Torrance\Deliverables\02. #12\XX. Pilot Report\Appendices\E. Sieve Analysis\Sieve Torrance Well 12 0730 URS

ATTACHMENT D

Water Quality Analysis for Isolated Aquifer Zone Testing

Zone Testing Analytical Results for Pilot Boring #12
City of Torrance - Department of Public Works
(Torrance, California)

Compound	Analytical Method	Units	Zone 1 (660 to 680)	Zone 2 (419 to 439)	Zone 3 (157 to 177)	Primary MCL	PHG	NL	Secondary MCL
Aggressive Index	---	---	12.21	11.42	11.86	---	---	---	---
Langlier Index	---	---	0.66	0.12	0.33	---	---	---	---
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	0.26	0.31	0.38	2	1	---	---
Chloride	EPA 300.0	mg/L	29	22	190E	---	---	---	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	1.6	0.60J	41	---	---	---	250, 500, 600
Perchlorate	EPA 331.0 (M)	ug/L	0.041J	0.071J	0.033J	6	6	---	---
Color	SM 2120 B	Color unit	5.0	5.0	5.0	---	---	---	15
Turbidity	SM 2130 B	NTU	0.070	0.050	<0.050	---	---	---	5
Odor	SM 2150 B	TON	<2.0	<2.0	2.0	---	---	---	3
Alkalinity, Total (as CaCO3)	SM 2320B	mg/L	281	202	236	---	---	---	---
Bicarbonate (as CaCO3)	SM 2320B	mg/L	281	202	236	---	---	---	---
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	68	100	300	---	---	---	---
Specific Conductance	SM 2510 B	umhos/cm	570	430	910	---	---	---	900, 1600, 2200
Solids, Total Dissolved	SM 2540 C	mg/L	425	280	600	---	---	---	500, 1000, 1500
pH	SM 4500 H+ B	pH units	7.63BV,BU	7.59BV,BU	7.56BV,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	11.0	6.75	5.08	---	---	---	---
Boron	EPA 200.7	mg/L	0.456	0.139B	0.124	---	---	1	---
Silicon	EPA 200.7	mg/L	14.2	12.8	13.7	---	---	---	---
Total Silica	EPA 200.7	mg/L	30.4	27.4	29.3	---	---	---	---
Arsenic	EPA 200.8	mg/L	<0.00100	<0.00100	0.00187	0.01	0.000004	---	---
Chromium	EPA 200.8	mg/L	0.00080J	0.00071J	<0.00100	0.05	withdrawn	---	---
Copper	EPA 200.8	mg/L	0.000351J	0.000295J	0.000329J	1.3	0.3	---	1
Vanadium	EPA 200.8	mg/L	0.000968J	0.000170J	0.000746J	---	---	0.05	---
Zinc	EPA 200.8	mg/L	0.00556J	0.0308	0.0115	---	---	---	5
Aluminum	EPA 200.8	mg/L	0.00116J	0.0126J	0.0103J	1	0.6	---	0.2
Calcium	EPA 200.8	mg/L	18.5	26.4	89.6	---	---	---	---
Iron	EPA 200.8	mg/L	0.134	0.0560	0.0518	---	---	---	0.3
Magnesium	EPA 200.8	mg/L	7.70.1	11.6	21.2	---	---	---	---
Manganese	EPA 200.8	mg/L	0.0154	0.0190	0.0398	---	---	0.5	0.05
Sodium	EPA 200.8	mg/L	1120	62.5	88.0	---	---	---	---
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	0.1	0.03	---	---
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	0.01	0.008	---	---
Heptachlor Epoxide	EPA 508	ug/L	<0.010	<0.010	<0.010	0.01	0.006	---	---
Methoxychlor	EPA 508	ug/L	<0.010	<0.010	<0.010	30	0.9	---	---
Toxaphene	EPA 508	ug/L	<1.0	<1.0	<1.0	3	0.03	---	---
Aroclor-1016	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
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	18	200	---	---
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 #12
City of Torrance - Department of Public Works
(Torrance, California)

Compound	Analytical Method	Units	Zone 1 (660 to 680)	Zone 2 (419 to 439)	Zone 3 (157 to 177)	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	2	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	0.19J	<2.0	<2.0	---	---	---	---
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	0.188,J	0.108,J	0.118,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	0.338,J	0.508,J	2.08	---	---	---	---
Dibenz (a,h) Anthracene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Diethyl Phthalate	EPA 525.2	ug/L	<2.0	<2.0	0.076J	---	---	---	---
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	---	---	---	---
Tebuthiuron	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	0.30J	0.27J	---	---	---	---
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	<0.50	<0.50	<0.50	---	---	---	---
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	<2.0	<2.0	<2.0	---	---	---	---
Acetone	EPA 524.2	ug/L	2.6B,J	2.6B,J	2.2B,J	---	---	---	---
Carbon Disulfide	EPA 524.2	ug/L	<0.50	<0.50	0.046J	---	---	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	0.15J	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	0.24J	---	---	---	---
1,1,1-Trichloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	200	1000	---	---

Zone Testing Analytical Results for Pilot Boring #12
City of Torrance - Department of Public Works
(Torrance, California)

Compound	Analytical Method	Units	Zone 1 (660 to 680)	Zone 2 (419 to 439)	Zone 3 (157 to 177)	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	3.2	0.39J	0.33J	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	<0.50	<0.50	0.032J	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	<0.50	<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	1	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	0.085J	0.039J	0.069J	---	---	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	0.076J	<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	<50	48J	---	---	---	---
1,2,3-Trichloropropane	SRL 524M-TCP	ug/L	0.0036J	0.0047J	0.0059	---	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.

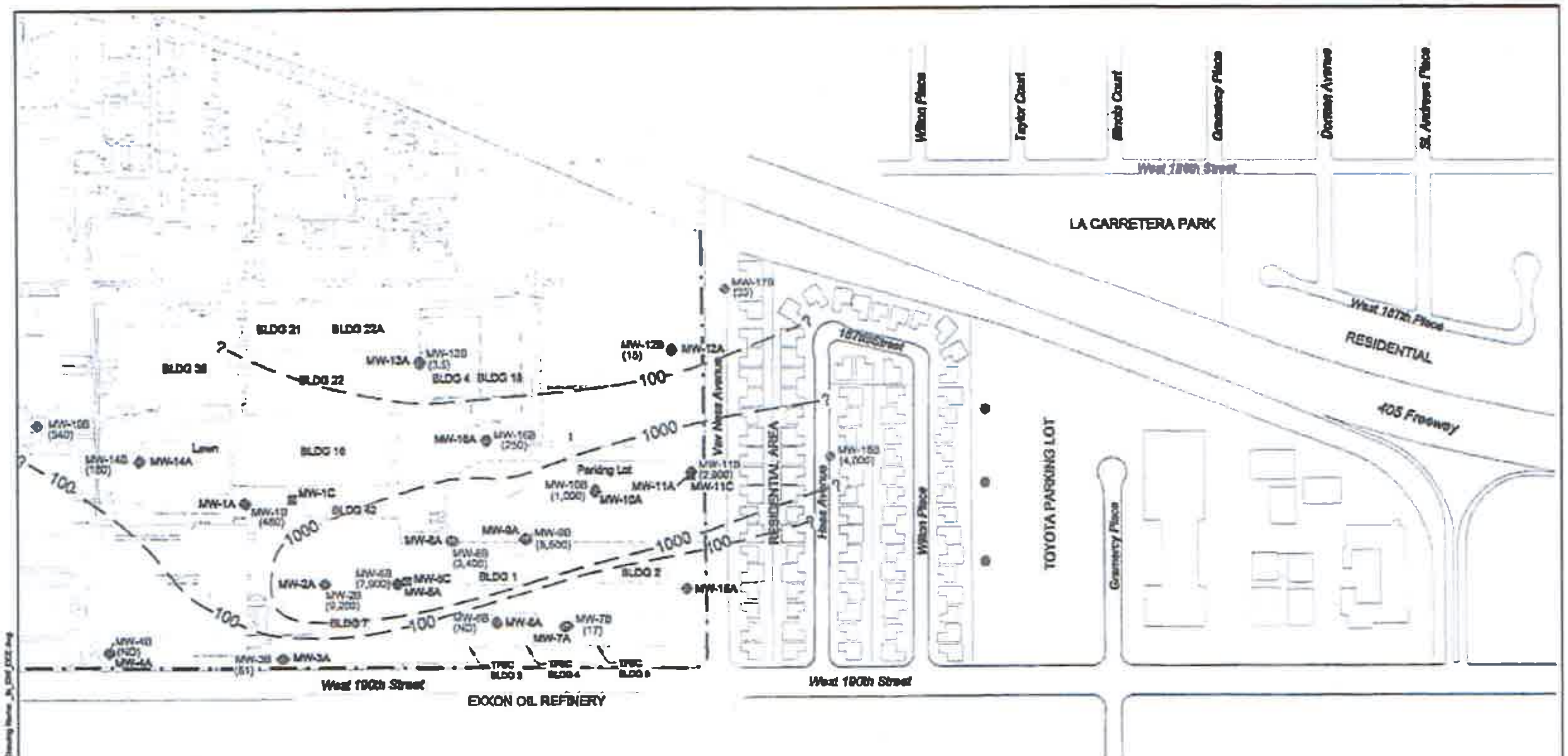
If you have any questions, please contact Mr. Steve Rowe, Project Manager at (213) 576-6755 or srowe@waterboards.ca.gov, or Ms. Thizar Tintut-Williams, Unit Chief, at (213) 576-6723 or twilliams@waterboards.ca.gov.

Sincerely,

Steve Rowe, 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 Duffin & Boynton Licensed Surveyors August and October 2006.

Proposed CPT Locations

Honeywell Site A, TFBC, & Storage Etc.
2525, 2203-2305, & 2545 West 190th Street
Torrance, California

By: pan	Date: 09/25/12	Project No.

amec

Figure 1

City's DOCs
RETURN TO
EMMANUEL