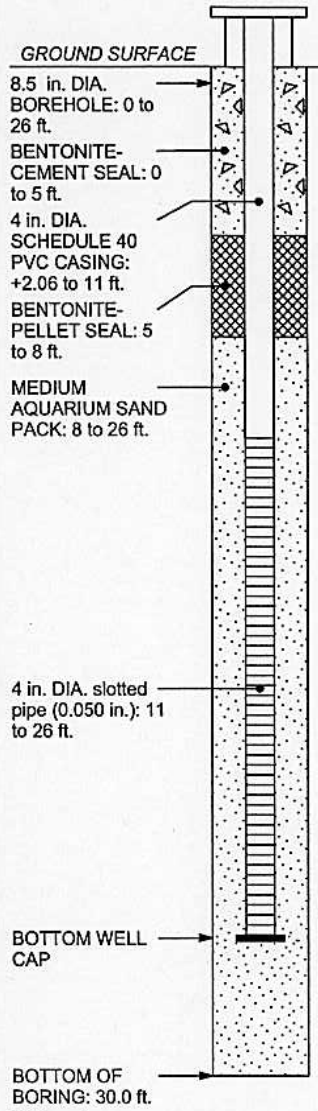
Boring Logs

Description

Well Construction Details and Log of Boring RG-6B
Well Construction Details and Log of Boring RG-5B
Well Construction Details and Log of Boring RG-11B
Well Construction Details and Log of Boring RG-7B
Well Construction Details and Log of Boring RGPZ-12D
Well Construction Details and Log of Boring RGPZ-3D
Well Construction Details and Log of Boring RGPZ-8D
Log of Boring RISBLT-05
Log of Boring RISBLT-07
Log of Boring RISBLT-08
Log of Boring RISBRC-01
Log of Boring RISBRC-02
Log of Boring RISBRC-03
Log of Boring RISBRC-04

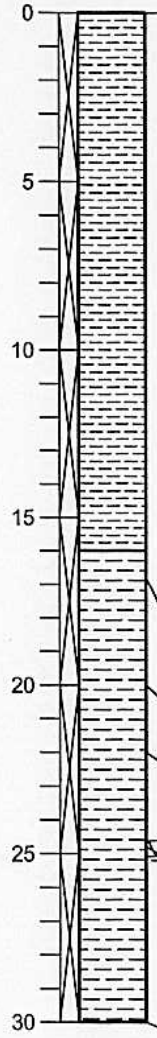
Top of PVC Casing
Elev. 477.50 ft.

Equipment
Sample Method
Hole Diameter 8.5 in.
Surface Elevation 475.44 ft. Date 5/17/00
Reference Datum MSL
Logged By



Recovery (inches)	PID Reading (ppm)
60	0.25
60	0.5
60	0.4
60	0.25
60	0.25
60	0.5

Depth (ft.) | Sample



DARK GRAYISH BROWN WEATHERED CLAYSTONE (2.5Y 4/2), dry, low hardness to moderately hard, moderately strong to weak, moderately to deeply weathered, abundant oxidation staining

@ 6 ft.: Moderate gypsum at fracture surfaces, abundant oxidation staining

Decrease in oxidation staining, increase in gypsum, dry, low hardness, deeply weathered, weak

@ 16 ft.: HSU/UHSU contact - transition zone
GREENISH GRAY UNWEATHERED CLAYSTONE (5.6Y 5/1), moderately hard, moderately strong, fresh to little weathering, little oxidation staining at 18, 19, and 20 ft. at fracture surfaces
@ 17 ft.: Driller notes harder drilling
@ 20 ft.: Color change to dark greenish gray (5.6Y 4/1)
@ 22 ft.: Horizontal fracture (video)
@ 24.3 ft.: fractured surface with oxidation staining
Groundwater encountered at 25 ft.

@ 30 ft.: Wet
Bottom of boring at 30 ft.

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

MACTEC

Well Construction Details and Log of Boring RG-6B

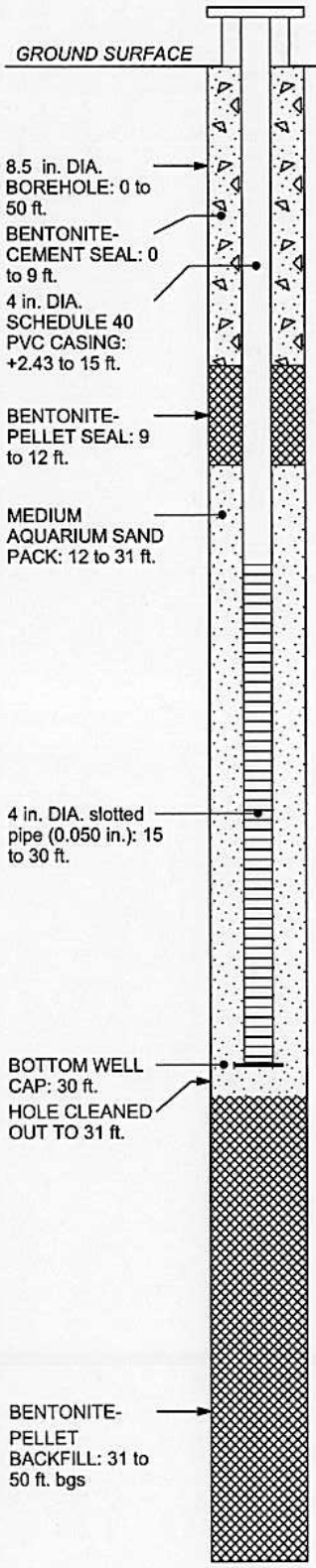
Well and Piezometer As-Built Report
Casmalia, California

PLATE **C-2**

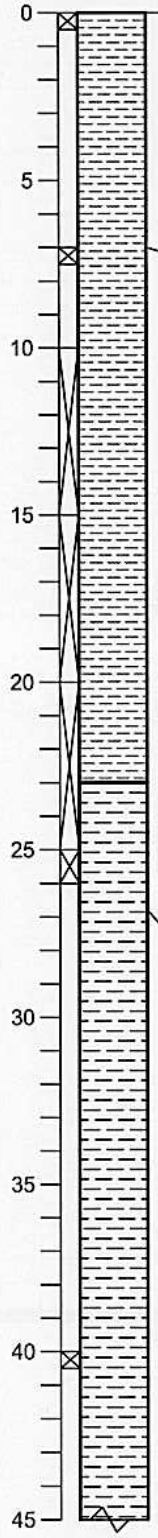
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Top of PVC Casing
Elev. 513.17 ft.

Equipment
Sample Method
Hole Diameter 8.5 in.
Surface Elevation 510.75 ft. **Date** 5/17/00
Reference Datum MSL
Logged By



Recovery (inches)	PID Reading (ppm)
6	ND
6	0.25
60	19
60	8
60	0.5
12	0.25
	0.25
0	ND
6	ND
	0.25



OLIVE WEATHERED CLAYSTONE (5Y 5/3), dry, low hardness, weak, moderately weathered, little oxidation staining at fractured and weathered surfaces, trace gypsum

@ 7 ft.: Driller notes harder drilling
DARK GREENISH GRAY UNWEATHERED CLAYSTONE (5GY 4/1), dry, moderately hard, moderately strong, fresh

@ 11 ft.: Low hardness, dry

OLIVE BROWN WEATHERED CLAYSTONE (2.5Y 4/3), wet, low hardness, highly weathered, abundant oxidation staining

@ 23 ft.: HSU/UHSU contact - transition zone.

DARK GREENISH GRAY UNWEATHERED CLAYSTONE (56Y 4/1), moderately hard to low hardness, moderately strong to weak, fresh

@ 27 ft.: Driller notes harder drilling

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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Well Construction Details and Log of Boring RG-5B

Well and Piezometer As-Built Report
Casmalia, California

PLATE
C-1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 8.5 in.
Surface Elevation 510.75 ft. Date 5/17/00
Reference Datum MSL
Logged By

Recovery (inches)	PID Reading (ppm)	Depth (ft.)	Sample	
		45		@ 45 ft.: Wet
		50		Bottom of boring at 50 ft.

BOTTOM OF BORING: 50 ft.
Well casing installed to 30 ft.

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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Well Construction Details and Log of Boring RG-5B

Well and Piezometer As-Built Report
Casmalia, California

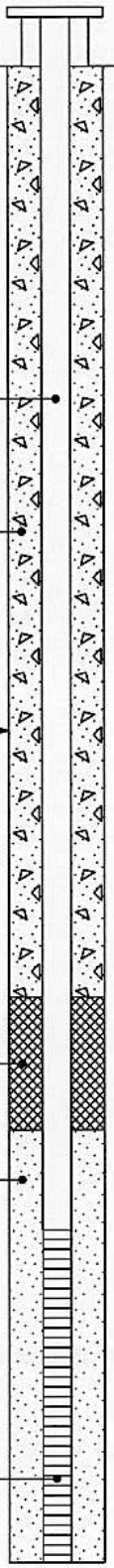
PLATE
C-1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Top of PVC Casing
Elev. 726.72 ft.

Equipment
Sample Method
Hole Diameter 8.5 in.
Surface Elevation 724.63 ft. **Date** 5/18/00
Reference Datum MSL
Logged By

GROUND SURFACE



4 in. DIA. SCHEDULE 40 PVC CASING: +2.08 to 35 ft.

BENTONITE-CEMENT SEAL: 0 to 28 ft.

8.5 in. DIAMETER BOREHOLE: 0 to 51 ft.

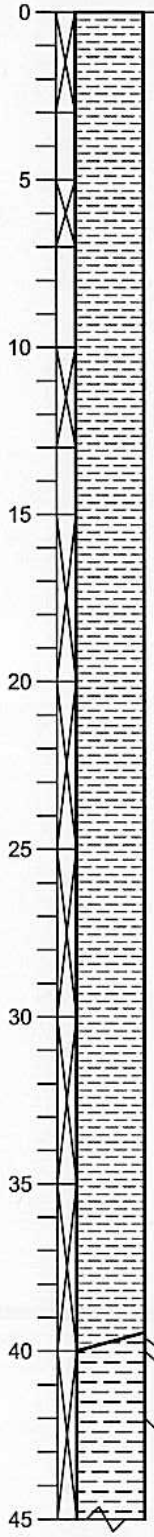
BENTONITE-PELLET SEAL: 28 to 32 ft.

MEDIUM AQUARIUM SAND PACK: 32 to 51 ft.

4 in. DIA. slotted pipe (0.050 in.): 35 to 50 ft.

Recovery (inches)	PID Reading (ppm)
36	
24	ND
36	ND
60	0.21
60	0.25
60	0.5
60	0.25
60	0.25
60	ND

Depth (ft.) Sample



0, 5, 10, 15, 20, 25, 30, 35, 40, 45

OLIVE WEATHERED CLAYSTONE (5Y 5/3), dry, low hardness, weak, moderately to deeply weathered, little to common oxidation staining

@ 11 ft.: Abundant oxidation staining visible on old fracture surfaces, gravelly inclusions

@ 15 ft.: Relic bedding - lens of light yellowish brown (2.5Y 5/6), trace black inclusion, increase oxidation staining, increase apparent relic fractures with oxidation

@ 21.5 ft.: Decrease in oxidation staining at fractures, abundant gypsum at all fractures

@ 32 ft.: Contains gypsum at fractures, oxidation staining at cracks, abundant oxidation from 34 ft.

Change to greenish gray (56Y 4/1), little weathering, oxidation staining on fractures, little gypsum, gradational to unweathered

@ 40 ft.: HSU/UHSU contact - transition zone
Harder drilling from 40 ft.
DARK GREENISH GRAY UNWEATHERED CLAYSTONE (56Y 4/1), moist, moderately hard, moderately strong, fresh
No evidence of fracturing from 40 ft.

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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Well Construction Details and Log of Boring RG-11B

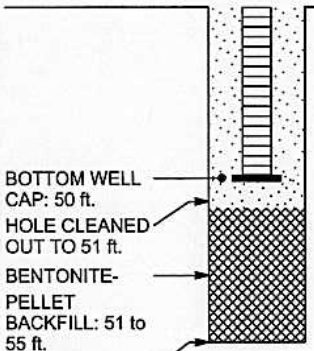
Well and Piezometer As-Built Report
Casmalia, California

PLATE
C-7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 8.5 in.
Surface Elevation 724.63 ft. Date 5/18/00
Reference Datum MSL
Logged By

Depth (ft.)	Sample	Recovery (inches)	PID Reading (ppm)
45			
		60	ND
50			
		60	8.25
55			



Well casing installed to 51 ft. bgs

Bottom of boring at 55 ft.

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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Well Construction Details and Log of Boring RG-11B

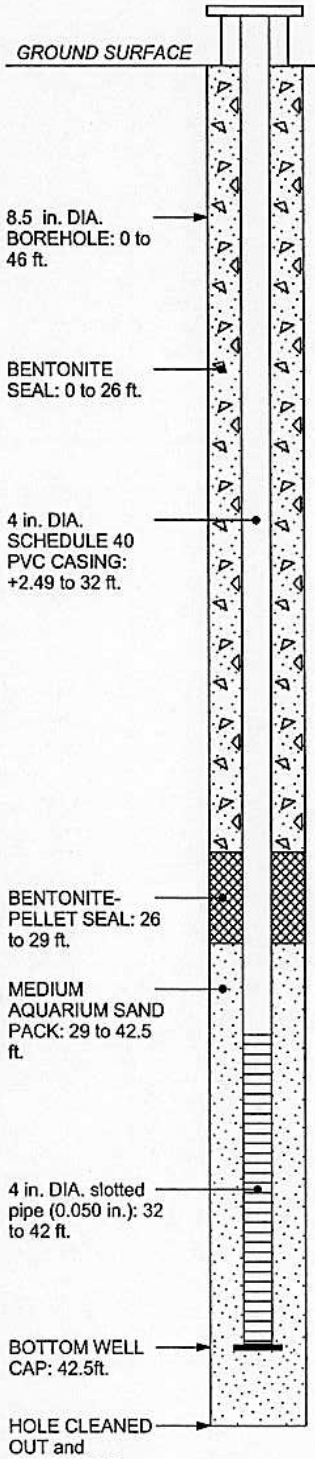
Well and Piezometer As-Built Report
Casmalia, California

PLATE **C-7**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Top of PVC Casing
Elev. 455.36 ft.

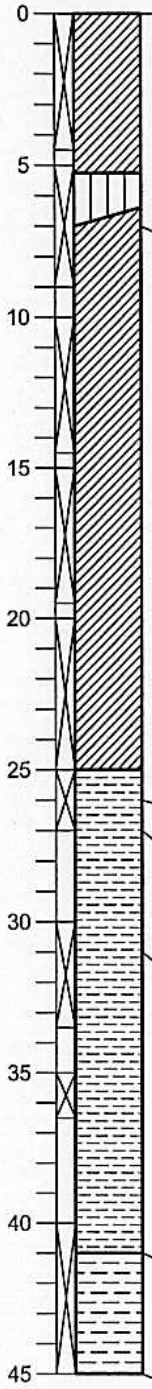
Equipment
Sample Method
Hole Diameter 8.5 in.
Surface Elevation 452.87 ft. **Date** 5/16/00
Reference Datum MSL
Logged By



Well casing installed to 42.5 ft. BGS

Recovery (inches)	PID Reading (ppm)
54	0.25
48	0.25
54	0.25
54	0.25
60	0.25
24	0.25
42	0.25
18	0.25
60	0.25

Depth (ft.) Sample



VERY DARK GRAYISH BROWN SANDY LEAN CLAY (CL) Firm, dry to moist, 50% clay, 30% fine to medium sand, 20% silt (Fill)

DARK GRAYISH BROWN SANDY SILT (ML) (10YR 4/2) Soft, dry, 40% silt, 30% lean clay, 30% fine sand (Fill)

VERY DARK GRAY SANDY LEAN CLAY (CL) (10YR 3/1) Firm, moist to dry, 60% clay, 20-30% fine sand, 10-20% silt (Fill)

@ 11 ft.: Change to black (10YR 2/1), very firm, dry, 10% claystone gravel

@ 15 ft.: Moist, moderately firm

VERY DARK GRAY LEAN CLAY (CL) (2.5Y 3/1) Soft, moist to wet, 65% clay, 20% silt, 15% fine sand, trace black peat material (Pond Bottom/Alluvium)

@ 24 - 27 ft.: Void developed requiring additional bentonite grout during well construction.

VERY DARK GRAY WEATHERED CLAYSTONE (2.5Y 3/4), low hardness, weak, moderately weathered, 20-30% angular fine gravel-sized claystone, silty clay matrix and sand

@ 31 ft.: Change to dark grayish brown (2.5Y 4/2), common dark yellowish brown (10YR 6/6) inclusions

@ 41 ft.: Driller notes harder drilling

DARK GREENISH GRAY UNWEATHERED CLAYSTONE, moderately hard, moderately strong, fresh to little weathering, common yellowish brown oxidation staining along fracture surfaces

Bottom of boring at 45 ft.

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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Well Construction Details and Log of Boring RG-7B

Well and Piezometer As-Built Report
Casmalia, California

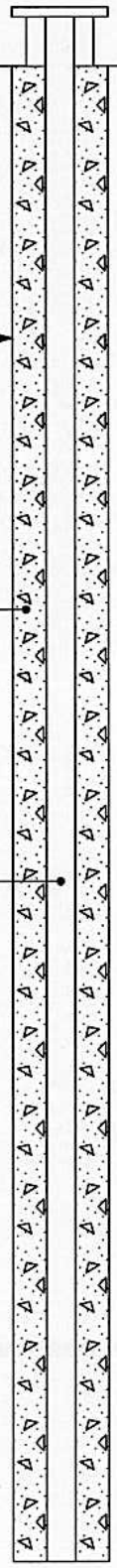
PLATE **C-3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Top of PVC Casing
Elev. 653.66 ft.

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 651.00 ft. Date 6/7/00
Reference Datum MSL
Logged By

GROUND SURFACE



6.5 in. DIAMETER BOREHOLE: 0 to 253 ft.

BENTONITE-CEMENT SEAL: 0 to 218 ft.

2 in. DIA. SCHEDULE 40 PVC CASING: +2.66 to 225 ft.

Recovery (inches)	PID Reading (ppm)
60	ND
60	0.2
60	0.3
60	ND
60	ND
60	0.1
36	2.3
60	ND
60	ND
42	ND

Depth (ft.) Sample

VERY DARK GRAY FAT CLAY (2.5Y 3/1)
Soft, dry

OLIVE WEATHERED CLAYSTONE (5Y 5/3), dry to moist, low hardness, weak, moderately weathered, calcite/gypsum and iron oxide and manganese coating fractures calcite/gypsum-coated fracture

@ 13.5 ft.: Calcite/gypsum-coated fracture
@ 14.5 ft.: Calcite/gypsum-coated fracture

@ 16 ft.: Color change to olive gray (5Y 4/2) (calcite/gypsum-coated fracture)
@ 17.25 ft.: Calcite/gypsum-coated fracture, vertical iron oxide staining along fracture to 19.5 ft.
@ 19 ft.: Color change to olive (5Y 5/3)
@ 20 ft.: Calcite/gypsum-coated fracture
@ 20.5 - 25 ft.: Vertical fracture coated with iron oxide

@ 26.5, 27, 27.5 & 28 ft.: Calcite/gypsum-coated fractures
@ 28.5 - 29.25 ft.: Vertical iron oxide-stained fracture

@ 30.5 ft.: Calcite/gypsum along fracture

@ 38 ft.: Calcite/gypsum-coated fracture

40 - 42 ft.: Abundant calcite/gypsum coating fractures, iron oxide also along fractures to 47 ft.

Abundant iron oxide along fractures

@ 49 ft.: Calcite/gypsum-coated fracture

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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Well Construction Details and Log of Boring RGPZ-12D

Well and Piezometer As-Built Report
Casmalia, California

PLATE
C-22

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 651.00 ft. Date 6/7/00
Reference Datum MSL
Logged By

Depth (ft.)	Sample	Recovery (inches)	PID Reading (ppm)	Description
55				Color change to dark greenish gray (5GY 4/1), iron oxide present along vertical fractures
		60	ND	@ 57.5 ft.: Calcite/gypsum-coated fracture
60				@ 61 ft.: UHSU/LHSU contact - transition zone
		60	ND	DARK GREENISH GRAY UNWEATHERED CLAYSTONE (5GY 4/1), dry to moist, moderately hard, weak, moderately consolidated
65				
		48	ND	
70				
		48	ND	
75				
		60	ND	
80		2	ND	@ 80 ft.: Wet top of core
85				
		36	ND	
90				
		60	ND	
95				
		60	ND	
100		24		@ 102 ft.: Fracture (video)
105				
		60	ND	
110				

BENTONITE-CEMENT SEAL: 0 to 218 ft.

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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Well Construction Details and Log of Boring RGPZ-12D

Well and Piezometer As-Built Report
Casmalia, California

PLATE **C-22**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 651.00 ft. Date 6/7/00
Reference Datum MSL
Logged By

Depth (ft.)	Sample	Recovery (inches)	PID Reading (ppm)	Notes
110		36	ND	
115		60	ND	@ 116 ft.: Fracture, moist (video)
120		24	ND	
125		42	ND	
130		12	ND	BENTONITE-CEMENT SEAL: 0 to 218 ft.
135		30	ND	
140		12	ND	
145		24	ND	@ 145 ft.: Fracture, not flowing (video)
150		24	ND	
155		24	ND	@ 155 ft.: Fracture, not flowing (video)
160		24	ND	
165				

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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Well Construction Details and Log of Boring RGPZ-12D

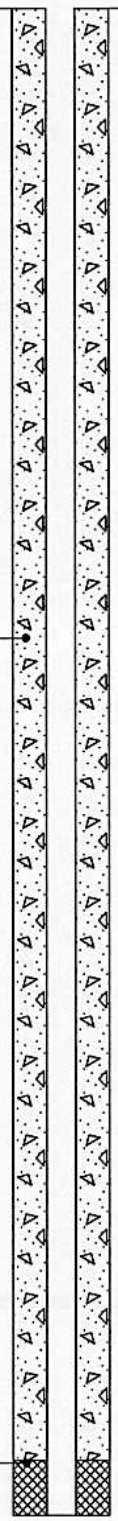
Well and Piezometer As-Built Report
Casmalia, California

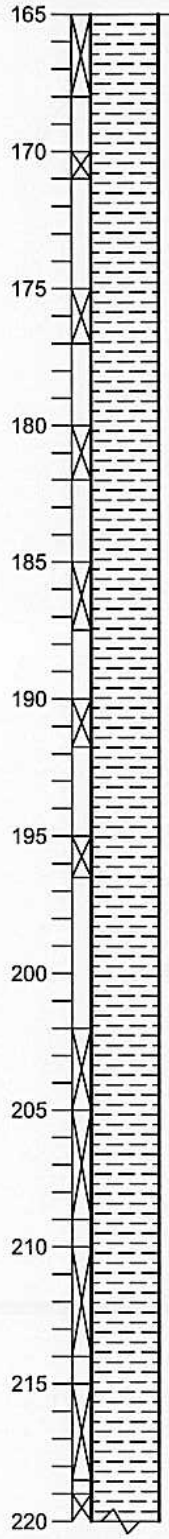
PLATE **C-22**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 651.00 ft. Date 6/7/00
Reference Datum MSL
Logged By

Recovery (inches)	PID Reading (ppm)
36	ND
12	ND
24	ND
24	ND
30	ND
21	
18	
36	
48	
48	
42	





Dark greenish gray (5GY 4/1), weak, moderately hard, moderately strong, white nodule at 203.7 ft., iron oxide staining at 205 ft.

@ 206.5 ft.: Possible horizontal fracture

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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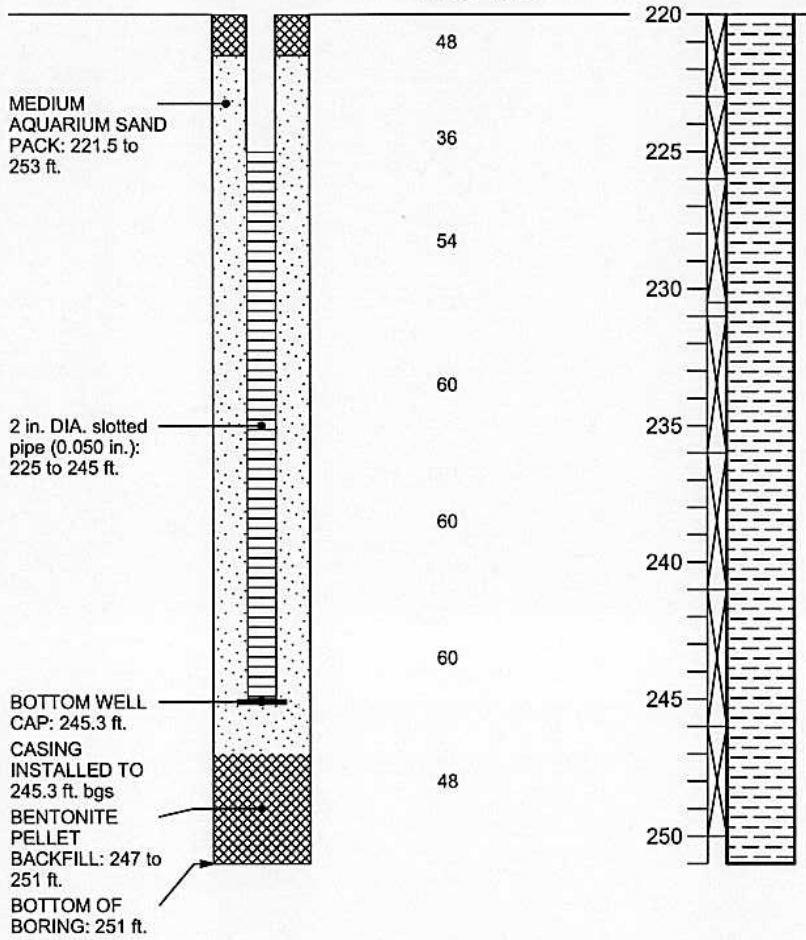
Well Construction Details and Log of Boring RGPZ-12D

Well and Piezometer As-Built Report
Casmalia, California

PLATE
C-22

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 651.00 ft. Date 6/7/00
Reference Datum MSL
Logged By



@ 229 ft.: Possible horizontal fracture

@ 239.5 ft.: Possible horizontal fracture

@ 245 ft.: Possible horizontal fracture (core and acoustic log)

Bottom of boring at 251 ft.

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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Well Construction Details and Log of Boring RGPZ-12D

Well and Piezometer As-Built Report
Casmalia, California

PLATE
C-22

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Top of PVC Casing
Elev. 593.54 ft.

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 591.37 ft. Date 7/10/00
Reference Datum MSL
Logged By

GROUND SURFACE

BENTONITE-CEMENT SEAL: 0 to 150 ft.

2 in. DIA. SCHEDULE 40 PVC CASING: +2.17 to 156 ft.

Recovery (inches)	PID Reading (ppm)
12	ND
0	
12	ND
12	1.6
18	ND
30	1.2
0	
24	
18	ND
0	
30	ND
30	2.2
30	24
30	7
24	ND
0	
0	

Depth (ft.) Sample

0, 5, 10, 15, 20, 25, 30, 35, 40, 45

LIGHT OLIVE BROWN GRAVELLY FAT CLAY WITH SAND (CH) (2.5Y 5/3) Soft to medium stiff, soft, 20-30% fine to coarse gravel-sized claystone, 15-25% fine to coarse sand-sized claystone

@ 1 ft.: Color change to very dark gray (2.5Y 3/1)

LIGHT OLIVE BROWN WEATHERED CLAYSTONE

@ 16.5 ft.: Color change to dark greenish gray

@ 17 ft.: UHSU/LHSU contact - transition zone

DARK GREENISH GRAY UNWEATHERED CLAYSTONE (5GY 3/1), low hardness, weak, fresh, moderately consolidated

Iron oxide coating fracture surfaces

Iron oxide staining decreases

@ 26 ft.: Diagonal fracture coated with iron oxide

@ 32.5 - 34.5 ft.: Vertical and diagonal fractures with iron oxide coating

@ 38 ft.: Vertically and diagonally fractured with iron oxide coatings

Vertical fracturing, iron oxide not present on all fracture surfaces

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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Well Construction Details and Log of Boring RGPZ-3D

Well and Piezometer As-Built Report
Casmalia, California

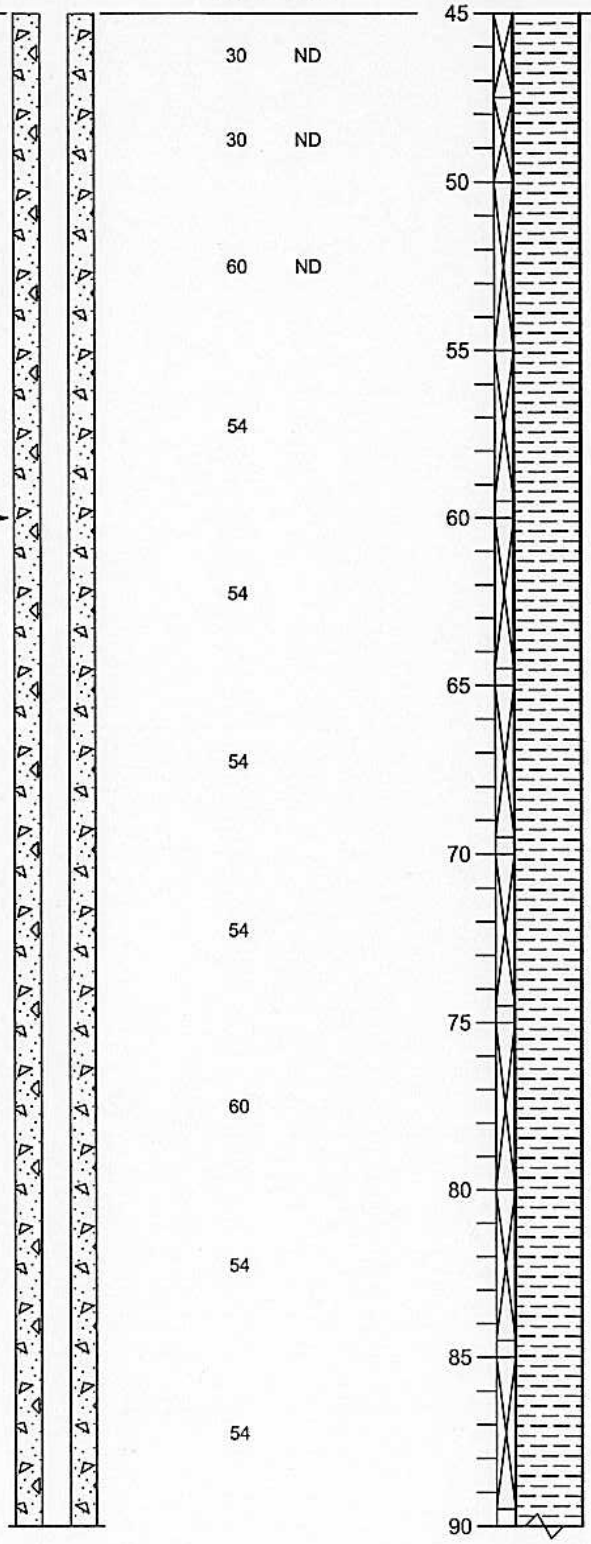
PLATE **C-6**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 591.37 ft. Date 7/10/00
Reference Datum MSL
Logged By

Recovery (inches)	PID Reading (ppm)
30	ND
30	ND
60	ND
54	
54	
54	
54	
60	
54	
54	

6.5 in. DIAMETER BOREHOLE: 0 to 200 ft.



Iron oxide staining no longer evident

@ 49.5 ft.: Fracture along bedding surface

No observed fractures

@ 63.1 - 63.6 ft.: Vertical fracture

@ 69 - 69.5 ft.: Diagonal fracture

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

MACTEC

Well Construction Details and Log of Boring RGPZ-3D

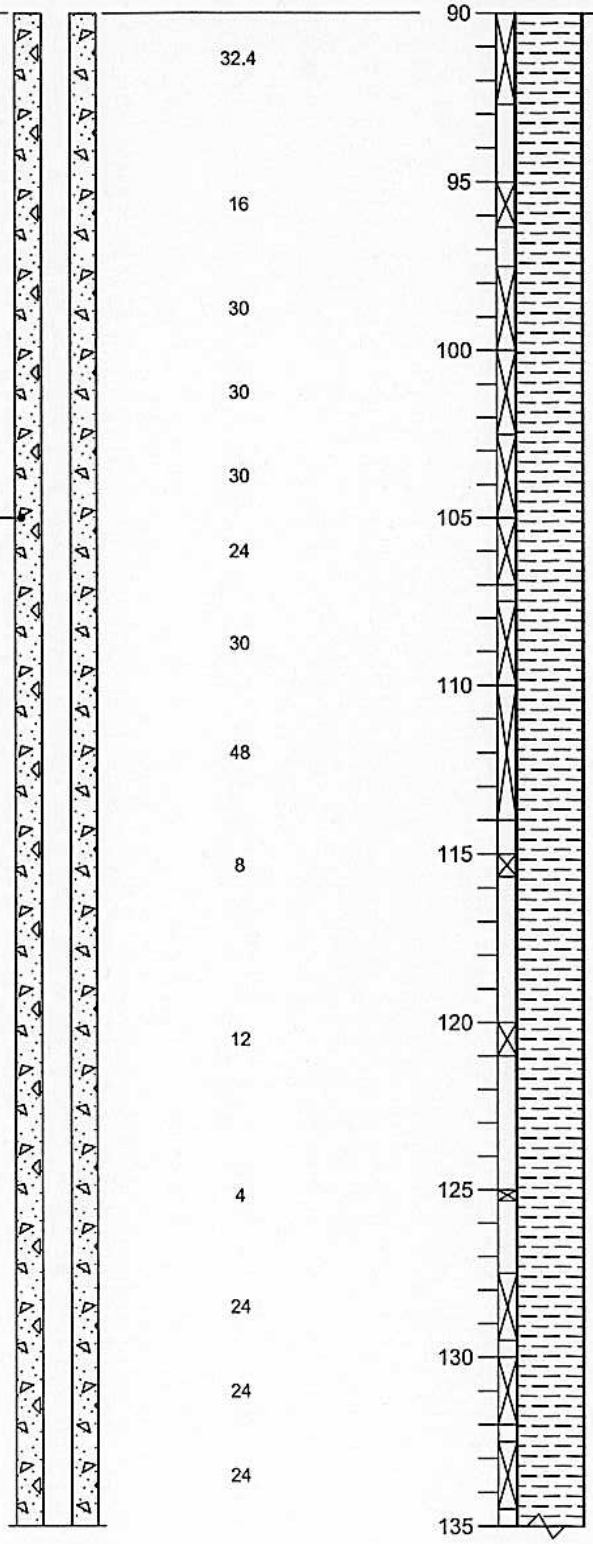
Well and Piezometer As-Built Report
Casmalia, California

PLATE **C-6**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 591.37 ft. Date 7/10/00
Reference Datum MSL
Logged By

Recovery (inches)	PID Reading (ppm)
32.4	
16	
30	
30	
30	
24	
30	
48	
8	
12	
4	
24	
24	
24	



@ 98.6 ft.: Subhorizontal fracture along with vertical fracture; mineralization along vertical fracture

@ 101 - 102 ft.: Vertical, horizontal fractures with white coating on fractures
@ 102 ft.: Dark fracture

@ 104 ft.: Near vertical fracture with white staining

@ 110.8 ft.: Fracture along bedding surface

@ 115.5 ft.: Breaks/fractures along bedding planes

Harder drilling, horizontal fracture @ 130 ft. (acoustic log)
@ 131 ft.: Water entry

@ 132 - 135 ft.: Pyrite mineralization, wet surfaces on fractures

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

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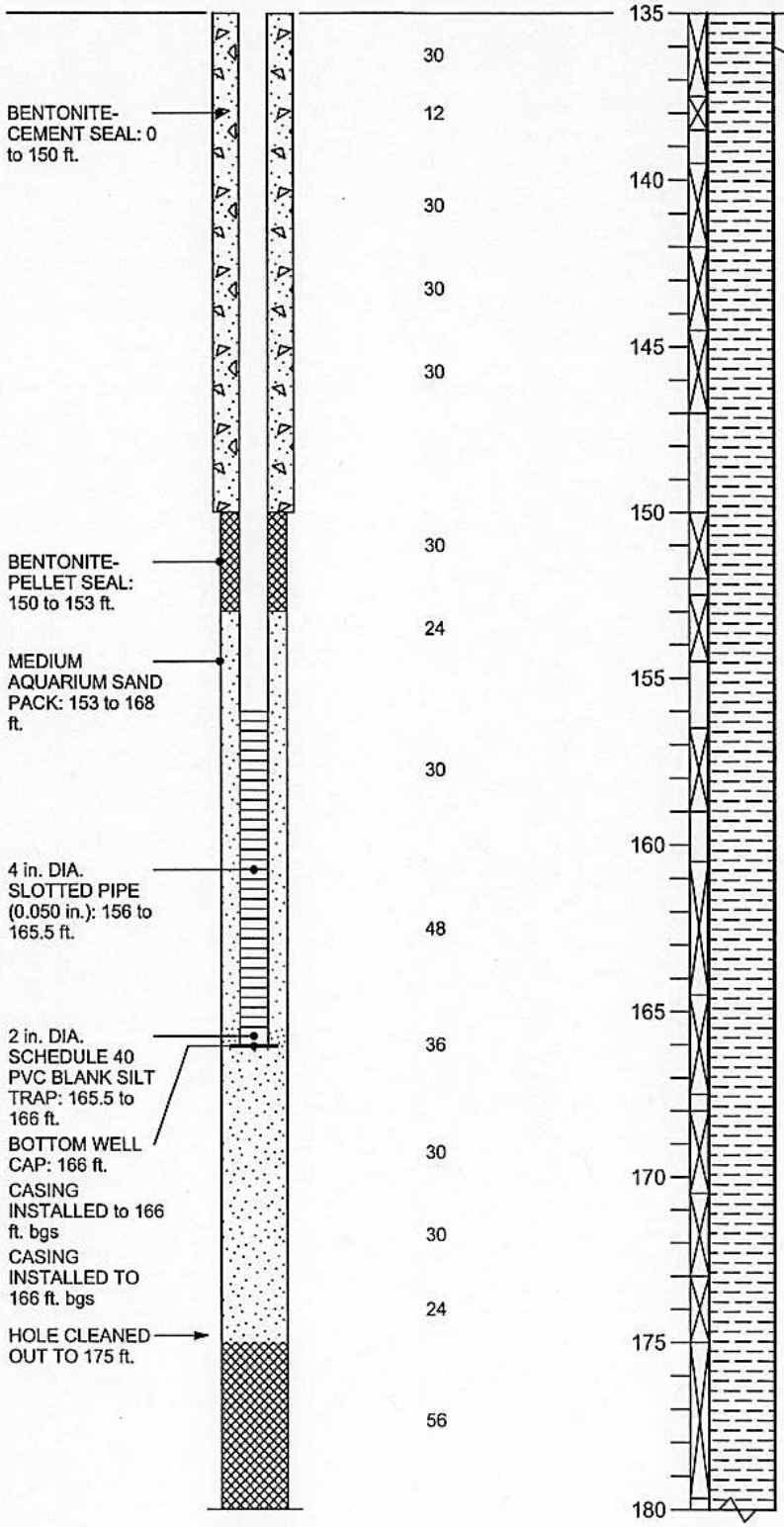
Well Construction Details and Log of Boring RGPZ-3D

Well and Piezometer As-Built Report
Casmalia, California

PLATE **C-6**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 591.37 ft. Date 7/10/00
Reference Datum MSL
Logged By



@ 135.5 ft.: Break along bedding (? fracture)
@ 136 ft.: Vertical fracture

@ 143 ft.: Fracture

@ 146 ft.: Fracture

@ 153.5 and 155 ft.: Horizontal fractures, moist surface on core

@ 157 and 159 ft.: Horizontal fractures, (core and acoustic log), water flow increase @ 157 ft. (video)

Harder material

@ 176.2 ft.: Horizontal fracture, white staining, core surface, wet, possible fracture at 175.5 ft.

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

MACTEC

Well Construction Details and Log of Boring RGPZ-3D

Well and Piezometer As-Built Report
Casmalia, California

PLATE **C-6**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 591.37 ft. Date 7/10/00
Reference Datum MSL
Logged By

Recovery (inches)	PID Reading (ppm)	Depth (ft.)	Sample	
		180		
60				
		185		@ 185 ft.: No visible fracture
60				
		190		
56				
		195		@ 195 ft.: No visible fracture
48				
		200		Bottom of boring at 200 ft.

BENTONITE PELLET BACKFILL: 175 to 200 ft.

BOTTOM OF BORING: 200 ft.

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

MACTEC

Well Construction Details and Log of Boring RGPZ-3D

Well and Piezometer As-Built Report
Casmalia, California

PLATE **C-6**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Top of PVC Casing
Elev. 448.51 ft.

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 446.13 ft. Date 6/15/00
Reference Datum MSL
Logged By

GROUND SURFACE

7.625 in. DIA. BOREHOLE: 0 to 55 ft.

BENTONITE-CEMENT SEAL: 0 to 124 ft.

2 in. DIA. SCHEDULE 40 PVC CASING: +2.18 to 130 ft.

Recovery (inches)	PID Reading (ppm)
42	3.5
36	ND
42	ND
12	ND
36	ND
18	ND
24	ND
60	ND
60	ND

Depth (ft.) Sample

0, 5, 10, 15, 20, 25, 30, 35, 40, 45

MOTTLED OLIVE BROWN, LIGHT OLIVE BROWN AND DARK YELLOWISH BROWN GRAVELLY FAT CLAY (CH) (2.5Y 5/6, 2.5Y 4.4 and 10YR 4/4) Medium stiff, moist, 10-20% sand-sized claystone fragments, 30-40% gravel-sized claystone fragments (Fill)

Becomes black with sand (5Y 2.5/2), medium stiff, moist, 10-20% sand-sized claystone fragments (Fill)

@ 15 ft.: Wet

LIGHT OLIVE BROWN CLAYEY GRAVEL (GC) Free water, 70% claystone fragments, 30% clay (Fill)

BLACK FAT CLAY WITH SAND (CH) (5Y 2.5/2) Soft, moist to wet, 30-40% sand-sized claystone fragments (Fill)

@ 26 ft.: Olive gray (5Y 4/2) (Driller notes very easy drilling.)

DARK GRAY WEATHERED CLAYSTONE (5Y 4/1), Moderately hard, moderate to little weathering, poorly to moderately consolidated, iron oxide staining along fractures

@ 35.0 ft.: UHSU/LHSU contact - transition zone

DARK GREENISH GRAY UNWEATHERED CLAYSTONE (5GY 3/1), Dry to moist, moderately hard, weak, fresh, moderately consolidated

@ 36.5 and 39.5 ft.: Vertical fractures

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

MACTEC

Well Construction Details and Log of Boring RGPZ-8D

Well and Piezometer As-Built Report
Casmalia, California

PLATE **C-14**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 446.13 ft. Date 6/15/00
Reference Datum MSL
Logged By

Depth (ft.)	Sample	Recovery (inches)	PID Reading (ppm)	Description
45				@ 44.5 ft.: Minor fracturing @ 45 ft.: Vertical fractures
50		2		
		8		
55		9		@ 54.5 ft.: Intensely fractured with calcite/gypsum deposits
		6		@ 57 ft.: Diagonal fracture with brownish mineralization
		12		
60		30		6.5 in. DIAMETER BOREHOLE: 0 to 150 ft.
		6		
65				
70		12		
		2		
75				BENTONITE-CEMENT SEAL: 0 to 124 ft. @ 76 ft.: Water entering from sidewall
		24		
80		18		
		30		@ 83.5 ft.: Diagonal fracture with brownish staining
85		30		
90				

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

MACTEC

Well Construction Details and Log of Boring RGPZ-8D

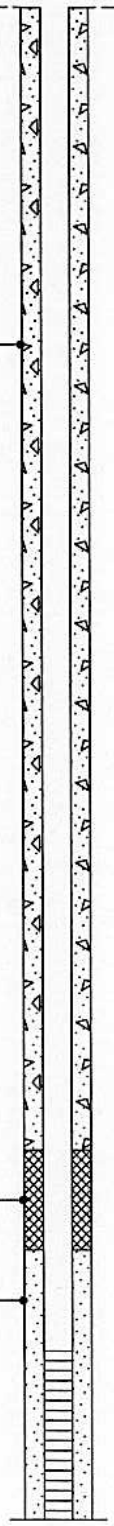
Well and Piezometer As-Built Report
Casmalia, California

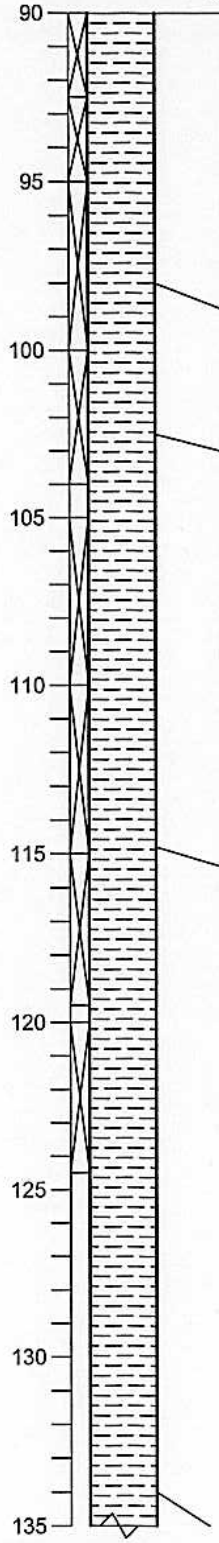
PLATE **C-14**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 446.13 ft. Date 6/15/00
Reference Datum MSL
Logged By

Recovery (inches)	PID Reading (ppm)
54	
30	
60	
48	
60	
60	
54	
54	





@ 91 ft.: Diagonal fracture
@ 92 ft.: Vertical fracture

@ 95.5 ft.: Diagonal and vertical fractures

@ 97 ft.: Horizontal fracture with brownish staining
@ 98 ft.: Vertical fracture

@ 101.2 ft.: Diagonal fracture with brown staining
@ 102.5 ft.: Diagonal and vertical fractures

@ 105 ft.: Horizontal fracture
@ 106 ft.: Vertical fracture
@ 106.8 ft.: Diagonal fracture

@ 108.2 ft.: Vertical fracture

@ 110.3 ft.: Horizontal fracture

@ 114.3-114.9 ft.: Vertical fracture
@ 114.8 ft.: Pyrite coating fracture

@ 116.3 ft.: Horizontal fracture with brownish staining

@ 123 ft.: Diagonal fracture

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

MACTEC

Well Construction Details and Log of Boring RGPZ-8D

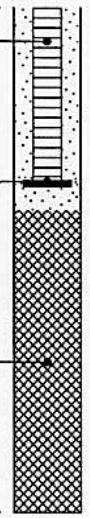
Well and Piezometer As-Built Report
Casmalia, California

PLATE
C-14

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Equipment
Sample Method
Hole Diameter 6.5 in.
Surface Elevation 446.13 ft. Date 6/15/00
Reference Datum MSL
Logged By

Recovery (inches)	PID Reading (ppm)
18	
30	
24	
12	



2 in. DIA. slotted pipe (0.050 in.): 130 to 140 ft.

2 in. DIA. SCHEDULE 40 PVC BLANK SILT TRAP: 140 to 140.3 ft.

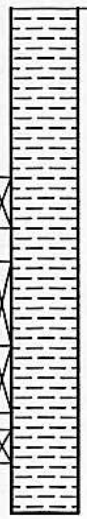
BOTTOM WELL CAP: 140.3 ft.

CASING INSTALLED at 140.3 ft.

BENTONITE PELLET BACKFILL: 141 to 150 ft.

BOTTOM OF BORING: 150 ft.

Depth (ft.) Sample



135

140

145

150

@ 134 ft.: Horizontal fracture (acoustic log and video)

@ 143 ft.: Small fracture (video)

Bottom of boring at 150 ft.

BORING_WELL_MACTEC 47540-7.GPJ GEOL.GDT 7/15/04

MACTEC

Well Construction Details and Log of Boring RGPZ-8D

Well and Piezometer As-Built Report
Casmalia, California

PLATE **C-14**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	47540 9100.03		7/04	

Site Id: RISBLT-05	Location: Casmalia Landfill
X Coordinate: 1236304.33	Elevation: 579.59'
Y Coordinate: 505900.98	Logged By: Mark Wanek
Date Started: 10/20/04	Certified By: David Myers
Date Completed: 10/21/04	Consulting Firm: URS
Drilling Method: MARL M5T "RHINO" LAR 6" HSA, VIBRATING H	Contractor: Gregg Drilling

Remarks: 6"X2" SS RING, SPLIT-SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
	0		SSS00292			Brown, (10YR, 4/3) Silty CLAY, w/gravel sized claystone fragments, moist, medium stiff
	5		SSS00293/294			ENCORES COLLECTED AT 5.5' DUPLICATE SAMPLE (SSS00294)
						BECOMES DK GRAY (2.5Y, 4/1) W/ GREENISH-GRAY (GLEY 1, 5/5GY) CLAYSTONE FRAGMENTS. FAINT SEWER ODOR.
570	10		SSS00295			END SAMPLING FOR 10/20/04 BECOMES LIGHT OLIVE-BROWN (2.5Y, 5/3) NO ODOR ENCORES COLLECTED AT 10.5'
	15					
560	20					

Site Id: RISBLT-05	Location: Casmalia Landfill
X Coordinate: 1236304.33	Elevation: 579.59'
Y Coordinate: 505900.98	Logged By: Mark Wanek
Date Started: 10/20/04	Certified By: David Myers
Date Completed: 10/21/04	Consulting Firm: URS
Drilling Method: MARL M5T "RHINO" LAR 6" HSA, VIBRATING H	Contractor: Gregg Drilling

Remarks: 6"X2" SS RING, SPLIT-SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
	20		SSS00296			
						BECOMES GRAYISH-BROWN (10YR, 5/2) FAINT ODOR
						ENCORES COLLECTED 20.5'
						BECOMES DK GRAYISH-BROWN (10YR, 4/2)
	25					
550						
	30					
						BECOMES LT YELLOWISH-BROWN (2.5Y, 6.3) CLAYSTONE W/ DARK YELLOWISH-BROWN (10YR, 4/6) MINERAL STAINING ALONG ABUNDANT FRACTURES, INDURATED, HARD.
						BECOMES GRAYISH-BROWN (2.5Y, 5/2) IN UNFRACTURED PORTION.
	35					
540	40					

Site Id: RISBLT-05	Location: Casmalia Landfill
X Coordinate: 1236304.33	Elevation: 579.59'
Y Coordinate: 505900.98	Logged By: Mark Wanek
Date Started: 10/20/04	Certified By: David Myers
Date Completed: 10/21/04	Consulting Firm: URS
Drilling Method: MARL M5T "RHINO" LAR 6" HSA, VIBRATING H	Contractor: Gregg Drilling

Remarks: 6"X2" SS RING, SPLIT-SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
	40					
						GYPSUM MINERALIZATION AT ~39.5'
			UNLISTED			
	45					FAINT ODOR
						Contact w/ unweathered claystone @45.5'
						FRACTURES & SECONDARY MINERALIZATION NO LONGER APPARANT AT 45.5'
530	50					
520						

Site Id: RISBLT-07	Location: Casmalia Landfill
X Coordinate: 1236268.35	Elevation: 580.69'
Y Coordinate: 505946.48	Logged By: Mark Wanek
Date Started: 10/27/04	Certified By: David Myers
Date Completed: 10/27/04	Consulting Firm: URS
Drilling Method: MARL M5T "RHINO" LAR 6" HSA, VIBRATING H	Contractor: Gregg Drilling

Remarks: 6"X2" SS RING, SPLIT-SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
	0		SSS00299			Yellowish Brown, (10YR, 5/4) Silty CLAY w/ gravel, moist, stiff
580						
	5		SSS00300			BECOME LIGHT OLIVE-BROWN (2.5Y, 5/3) W/ GRAND-SIZE CLAYSTONE FRAGMENTS.
						BECOMES GREENISH-GRAY (GLEY 1, 4/5GY)
						BECOMES VERY DARK GRAY (2.5Y, 3/1) FAINT ODOR
			SSS00301			ENCORES COLLECTED AT 9.5'
	10					
570						
	15					
	20					

Site Id: RISBLT-07	Location: Casmalia Landfill
X Coordinate: 1236268.35	Elevation: 580.69'
Y Coordinate: 505946.48	Logged By: Mark Wanek
Date Started: 10/27/04	Certified By: David Myers
Date Completed: 10/27/04	Consulting Firm: URS
Drilling Method: MARL M5T "RHINO" LAR 6" HSA, VIBRATING H	Contractor: Gregg Drilling

Remarks: 6"X2" SS RING, SPLIT-SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
	20		SSS00302			BECOMES LIGHT YELLOWISH-BROWN (2.5Y, 6/4) CLAYSTONE HARD, FRACTURED, FRIABLE, HARD
560						
	25					
	30					BECOMES GRAYISH-BROWN (2.5Y, 5/2)
550						
	35					
						GYPSUM IN FRACTURES
				9.6 ppm		BECOMES DARK GRAY (10YR, 4/1), ODOR
	40					

Site Id: RISBLT-07	Location: Casmalia Landfill
X Coordinate: 1236268.35	Elevation: 580.69'
Y Coordinate: 505946.48	Logged By: Mark Wanek
Date Started: 10/27/04	Certified By: David Myers
Date Completed: 10/27/04	Consulting Firm: URS
Drilling Method: MARL M5T "RHINO" LAR 6" HSA, VIBRATING H	Contractor: Gregg Drilling

Remarks: 6"X2" SS RING, SPLIT-SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
	40					BECOMES LIGHT YELLOWISH-BROWN (2.5Y, 6/3) W/ DARK YELLOWISH-BROWN (10YR, 4/6) INFILLING ALONG FRACTURES.
540						
			SSS00304	1.0 ppm		DUPLICATE SAMPLE (SSS00305) COLLECTED
						BECOMES MOTTLED W/DARK GRAY (2/5Y, 4/1)
			SSS00305			
						BECOMES DARK GRAY, DECREASED ABUNDANCE OF FRACTURES.
						No apparent fractures, contact w/unweathered claystone @ 46.2'
	50					
530						

Site Id: RISBLT-08	Location: Casmalia Landfill
X Coordinate: 1236212.88	Elevation: 579.31'
Y Coordinate: 505914.35	Logged By: Mark Wanek
Date Started: 10/24/04	Certified By: David Myers
Date Completed: 10/24/04	Consulting Firm: URS
Drilling Method: MARL M5T "RHINO" LAR 6" HSA, VIBRATING H	Contractor: Gregg Drilling

Remarks: 6"X2" SS RING, SPLIT-SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
	0		SSS00306			Brown, (10YR 4/3) Silty CLAY, w/some gravel, moist, medium stiff
						BECOMES NO GRAVEL
	5		SSS00307			BECOMES LIGHT YELLOWISH-BROWN (2.5Y, 6/4) W/ GRAVEL-SIZE CLAYSTONE FRAGMENTS.
						ENCORES COLLECTED AT 5.5'
570						
	10		SSS00308			BECOMES LIGHT YELLOWISH-BROWN (2.5Y, 6/4) W/ ABUNDANT LARGE CLAYSTONE FRAGMENTS.
						BECOMES LIGHT YELLOWISH-BROWN (2.5Y, 6/4) CLAYSTONE
						ENCORES COLLECTED AT 10.5'
	15					
560						
	20					

Site Id: RISBLT-08	Location: Casmalia Landfill
X Coordinate: 1236212.88	Elevation: 579.31'
Y Coordinate: 505914.35	Logged By: Mark Wanek
Date Started: 10/24/04	Certified By: David Myers
Date Completed: 10/24/04	Consulting Firm: URS
Drilling Method: MARL M5T "RHINO" LAR 6" HSA, VIBRATING H	Contractor: Gregg Drilling

Remarks: 6"X2" SS RING, SPLIT-SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
	20					
			SSS00309			
	25					
550						
	30					BECOMES LIGHT OLIVE-BROWN (2.5Y, 5/4) W/ DARK YELLOWISH-BROWN (10YR, 4/6) COLORING ALONG FRACTURES.
						BECOMES OLIVE-GRAY (5Y, 5/2) W/ OLIVE-BROWN (2.5Y, 4/4) COLORING ALONG FRACTURES.
	35					
						GYPSUM IN FRACTURES
						BECOMES OLIVE-BROWN (2.5Y, 4/4) W/ DARK YELLOWISH-BROWN (10YR, 4/6) ALONG ABUNDANT FRACTURES.
540						
	40					

Site Id: RISBLT-08	Location: Casmalia Landfill
X Coordinate: 1236212.88	Elevation: 579.31'
Y Coordinate: 505914.35	Logged By: Mark Wanek
Date Started: 10/24/04	Certified By: David Myers
Date Completed: 10/24/04	Consulting Firm: URS
Drilling Method: MARL M5T "RHINO" LAR 6" HSA, VIBRATING H	Contractor: Gregg Drilling

Remarks: 6"X2" SS RING, SPLIT-SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
	40					INCREASED MOISTURE CONTENT
						DECREASED GYPSUM, BECOMES LIGHT YELLOWISH-BROWN (2.5Y, 6/3) W/ OLIVE-BROWN FRACTURES. BECOMES WET
	45					ENCORES COLLECTED AT 43'
						MODERATE ODOR
			SSS00311			BECOMES DARK GRAY (5Y, 4/1) W/ DARK YELLOWISH-BROWN (10YR, 4/6) & GYPSUM SECONDARY MINERALIZATION ALONG FRACTURES.
530						
	50					@ 50.5' Contact w/ unweathered claystone
						NO FRACTURES OR SECONDARY MINERALIZATION APPARENT.
						Boring completed to 52' on 10-29-04 Backfilled with bentonite grout.
520						

Site Id: RISBRC-01	Location: Casmalia Landfill
X Coordinate: 1235907.89	Elevation: 600.39'
Y Coordinate: 507126.25	Logged By: Mark Wanek
Date Started: 10/07/04	Certified By: David Myers
Date Completed: 10/07/04	Consulting Firm: URS
Drilling Method: MARL MST "RHINO" LAR HSA, VIBRATING HAMM	Contractor: Gregg Drilling

Remarks: 2"X6" SS RING, SPLIT SPOON SAMPLER, SPLIT W/ CHWM HILL

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
600	0		SSS00113			Very Dark Grayish Brown, (10YR, 3/2) Silty CLAY w/
						BECOMES OLIVE-BROWN (2.5Y, 4/3)
						STEP OUT 1' N TO COLLECT SAMPLE
						GROUNDWATER ENCOUNTERED AT 3.5'
	5					BECOMES DARK GRAY (5Y, 4/1) STAINED, BECOMES WET.
			SSS00114			BECOMES VERY DARK GRAY (5Y, 3/1) SANDY, MODERATE TO STRONG PETROLEUM ODOR.
	10					
590						BECOMES LT OLIVE-BROWN (2.5Y, 5/4) W/ STRONG BROWN (7.5YR, 4/6) MINERAL STAINING ALONG FRACTURES.
			SSS00115			
	15					ENCORES COLLECTED AT 14.5'
						contact between weathered/unweathered claystone @ 16.5'
						BECOMES DARK GRAY (2.5Y, 4/1), NO FRACTURES APPARENT
						NOTE: 14' SAMPLE COINCIDES W/CONTACT, SO BORING TERMINATED.# WATER
	20					

Site Id: RISBRC-02	Location: Casmalia Landfill
X Coordinate: 1235904.75	Elevation: 593.40'
Y Coordinate: 507079.58	Logged By: Mark Wanek
Date Started: 10/07/04	Certified By: David Myers
Date Completed: 10/07/04	Consulting Firm: URS
Drilling Method: MARL MST "RHINO" LAR HSA, VIBRATING HAMM	Contractor: Gregg Drilling

Remarks: 2"X6" SS RING, SPLIT SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
	0		SSS00118			Very Dark Grayish-Brown, (10YR, 3/2) Silty CLAY w/abundant light Yellowish brown (2.5Y, 6/4) gravel-sized claystone fragments
590						GROUNDWATER ENCOUNTERED AT 3'.
						BECOMES WET
	5		SSS00119			
						BECOMES DARK OLIVE-GRAY (5Y, 3/2) HEAVILY STAINED W/ FAINT TO MODERATE ODOR, SOFT
						BECOMES BLACK
	10		SSS00120			BECOMES DARK GREENISH-GRAY (GLEY1, 4/5GY) NO ODOR, MODERATE TO HEAVY STAINING
						BECOMES OLIVE-BROWN (2.5Y, 4/3) AND DK YELLOWISH-BROWN (10YR, 4/6) CLAYSTONE INDURATED, HIGHLY FRACTURED.
580						
						DUPLICATE SAMPLE (SSS00123) COLLECTED
	15					
						BECOMES DARK GRAY (5Y, 4/1) W/ FEW FRACTURES & DARK YELLOWISH-BROWN (10YR, 4/6) MINERAL STAINING.
						BECOMES NO APPARENT FRACTURES.
						contact w/unweathered claystone.
						Boring completed to 18' on 10-07-04 Borehole backfilled with bentonite
	20					

Site Id: RISBRC-03	Location: Casmalia Landfill
X Coordinate: 1235748.33	Elevation: 518.12'
Y Coordinate: 506599.26	Logged By: Mark Wanek
Date Started: 10/12/04	Certified By: David Myers
Date Completed: 10/12/04	Consulting Firm: URS
Drilling Method: MARL MST "RHINO" LAR HSA, VIBRATING HAMM	Contractor: Gregg Drilling

Remarks: 2"X6" SS RING, SPLIT SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
	0		SSS00126			Light Brownish-gray, (10YR, 6/2) Silty Claystone, dry, soft, highly fragmented
						DARK GRAYISH BROWN (10YR, 4/2) CLAYEY SILT, MOIST, LOOSE, ROOT PARTICLES, GRAVEL SIZED FRAGMENTS OF CLAYSTONE.
						NOTE: STEP-OUT BORING TO COLLECT 4-5.5' CONTACT SAMPLE
	5					HARD DRILLING
						@5.6 feet, contact w/unweathered claystone
						BECOMES UNIFORMLY DARK GRAY (2.5Y, 4/1) W/ NO APPARENT FRACTURES OR SECONDARY MINERAL STAINING.
						Boring completed to 6.5 feet on 10-12-04
						Backfilled with bentonite
510						
	10					
	15					
500						
	20					

Site Id: RISBRC-04	Location: Casmalia Landfill
X Coordinate: 1235649.09	Elevation: 490.42'
Y Coordinate: 506186.02	Logged By: Mark Wanek
Date Started: 10/12/04	Certified By: David Myers
Date Completed: 10/12/04	Consulting Firm: URS
Drilling Method: MARL MST "RHINO" LAR HSA, VIBRATING HAMM	Contractor: Gregg Drilling

Remarks: 2"X6" SS RING, SPLIT SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
490	0		SSS00129			Very Dark Grayish-brown, (10YR, 3/2) Silty CLAY, w/abundant sand to gravel-sized claystone fragments, moist, stiff
						BECOMES LIGHT YELLOWISH-BROWN (2.5Y, 6/4), SILT, SOFT.
						BECOMES VERY DARK GRAYISH-BROWN (10YR, 3/2) STIFF, CLAYSTONE FRAG'S BECOMES DK YELLOWISH BROWN (10YR, 4/6), INCREASED MOISTURE CONTENT.
	5		SSS00130			GROUNDWATER ENCOUNTERED AT 5'
						BECOMES MED STIFF.
						ENCORES COLLECTED AT 5.5'
						BECOMES OLIVE-BROWN (2.5Y, 4/3)
						BECOMES VERY DK GRAYISH-BROWN (10YR, 3/2) DECREASED CLAYSTONE FRAGMENTS
480	10		SSS00131			
	15					BECOMES VERY DARK GRAY (10YR, 3/1)
	20					BECOMES MED. STIFF, ABUNDANT SAND SIZED CLAYSTONE FRAGMENTS.

Site Id: RISBRC-04	Location: Casmalia Landfill
X Coordinate: 1235649.09	Elevation: 490.42'
Y Coordinate: 506186.02	Logged By: Mark Wanek
Date Started: 10/12/04	Certified By: David Myers
Date Completed: 10/12/04	Consulting Firm: URS
Drilling Method: MARL MST "RHINO" LAR HSA, VIBRATING HAMM	Contractor: Gregg Drilling

Remarks: 2"X6" SS RING, SPLIT SPOON SAMPLER

Elevation (ft)	Depth (ft)	Recovery	Sample No.	PID	Graphic Log	Material Description
470	20					BECOMES DARK OLIVE GRAY (5Y, 3/2) CLAYSTONE, HARD, NO FRACTURES APPARENT.
						(contact w/unweathered claystone at 20.3')
						No groundwater encountered
						boring backfilled with bentonite
	25					
	30					
460						
	35					
	40					