Date 10/13/04
Driller Air Rotary
Drilling Method ARCH
Sampler Continuous Core
Hammer Weight NA **Drop** NA
Logged by **Datum**
Surface Elevation 744.68 **Hole Dia.** 6.5 in.
Northing 507565.743 **Easting** 1236761.911

Well Construction Details

Top of PVC Casing Elev. **746.48 ft.**

GROUND SURFACE

6.5" DIA. BOREHOLE: 0 to 240 ft.

2" DIA. SCHED. 40 PVC CASING: +1.8 to 200 ft.

BENTONITE-CEMENT SEAL: 0 to 194 ft.

Depth (ft.)	Sample	Recovery (inches)	PID Reading (ppm)	Description
0				Sandy Silt (ML) Topsoil
				Light Gray Weathered Mudstone, Moderately consolidated, massive, intensely fractured, low hardness, weak, deeply to moderately weathered, iron oxide along abundant fractures
			0	
		24		
5			0	
		48		From 7.2 - 7.4 ft.: 75° fracture From 7.7 - 8.3 ft.: 10° fracture @ 9 ft.: Liesegang banding, iron oxide throughout
10				
			0	@ 12 ft.: Some dark brown oxide flecks From 12.8 - 14 ft.: Iron oxide coated fractures of 15° - 75°
		30		
15				@ 14.5 ft.: two iron oxide horizontal to subhorizontal bands along bedding plane
			0	@ 18.5 ft.: Iron oxide and black oxide along fractures ranging from horizontal to vertical
		21		
20				
25			0	@ 25 ft.: Change to Grayish Brown (2.5Y 3/2) with horizontal gypsum and iron oxide in-filling, friable, platey bedding, poorly consolidated; small fractures at 25.3, 25.8, 27.2, 28.8, 29 and 29.8 ft. with gypsum
		30		
			0	@ 28 ft.: Color change to Dark Grayish Brown (2.5Y 4/2), flakey platey bedding
		30		
30				Dark Gray Unweathered Mudstone (5Y 4/1), Platey, shaley bedding, weak, near vertical
		24		From 32 to 37.8 ft.: Fracture pair
			0	
35				

BORING_WELL2 CASMALIARIFS.GPJ GEOL.GDT 12/13/10

Well Construction Details and Log of Boring RIPZ-10D

Final Remedial Investigation Report
Casmalia Resources Superfund Site
Casmalia, California

PLATE

E9-21

DRAWN	JOB NUMBER	CHECKED	CHCK'D DATE	APPROVED	APPRV'D DATE
CN	4088097619	WJF	1/11	WBC	1/11

Date	10/13/04
Driller	Air Rotary
Drilling Method	ARCH
Sampler	Continuous Core
Hammer Weight	NA **Drop** NA
Logged by	**Datum**
Surface Elevation	744.68 **Hole Dia.** 6.5 in.
Northing	507565.743 **Easting** 1236761.911

Well Construction Details

Depth (ft.)	Recovery (inches)	PID Reading (ppm)	Sample	
35	60	0		
40	60	0		From 43 - 47.5 ft.: Weaker appearance, planar bedding "discs"
45	54	0		From 47 - 49 ft. and 48.6 to 49.8 ft.: Fractures 15° off vertical, some iron oxide
50	60	0		@ 54 ft.: 15° off vertical and near vertical fracture at 54 - 59.5 ft. and 54.8 - 55.3 ft.; no visible oxides
55	60	0		
60	60	0		
65	60	0		@ 65 ft.: Light gray harder inclusion, possible redox feature
70	30			

BORING_WELL2 CASMALIARIFS.GPJ GEOL.GDT 12/13/10

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Final Remedial Investigation Report
Casmalia Resources Superfund Site
Casmalia, California

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Drilling Method	ARCH
Sampler	Continuous Core
Hammer Weight	NA **Drop** NA
Logged by	**Datum**
Surface Elevation	744.68 **Hole Dia.** 6.5 in.
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Well Construction Details

Depth (ft.)	Recovery (inches)	PID Reading (ppm)	Description
70			
		0	
	36		@ 73 ft.: Change to Gray (5Y 5/1), moderately consolidated, thin bedding; no in-situ fracturing, low hardness, moderately strong
75		0	
	60		Subhorizontal bedding planes
80			
		0	
	45		
85			
		0	
	39		@ 88 ft.: Fracture zone with white oxides, weaker material, faster drilling
90			
		0	
	24		
		0	
	24		
95		0	
	60		@ 96.5 ft.: White bedding surface
100		0	
	60		
105			@ 104.8 ft.: Possible fine 65° off vertical fracture

BORING_WELL2 CASMALIARIFS.GPJ GEOL.GDT 12/13/10

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Casmalia Resources Superfund Site
Casmalia, California

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Well Construction Details

Recovery (inches)	PID Reading (ppm)	Depth (ft.)	Sample	
	0	105		
60				
		110		
	0			
30				
	0			@ 113 ft.: Harder material
24				
		115		From 114.9 - 115.3 ft.: White, light gray bedding From 115.4 - 116, 117 - 118.5 and 119.5 - 120 ft.: Harder
	0			
54				
				@ 119 ft.: Angular fractures, no oxides
		120		
	0			
21				
		125		
12				
	0	130		@ 130.6 ft.: White bedding ~0.5" thick, 70° off vertical
60				@ 132.8 ft.: White bedding 75° off vertical
	0	135		
60				@ 137.1 ft.: White bedding 70° off vertical
		140		

BORING_WELL2 CASMALIARIFS.GPJ GEOL.GDT 12/13/10

Well Construction Details and Log of Boring RIPZ-10D

Final Remedial Investigation Report
Casmalia Resources Superfund Site
Casmalia, California

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Sampler	Continuous Core
Hammer Weight	NA **Drop** NA
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Recovery (inches)	PID Reading (ppm)	Depth (ft.)	Sample	
	0	140		@ 141.5 ft.: White bedding 75° off vertical
60				@ 142.7 ft.: 80° fracture, no oxides
	0	145		@ 145.7 ft.: White bedding 75° off vertical
60				@ 148.3 ft.: 75° off vertical fracture
	0	150		
60				
	0	155		
60				@ 157.6 ft.: 80° off vertical fracture, iron oxide
		160		
				@ 163.9 ft.: 80° off vertical fracture, no oxides
	0	165		@ 165.4 ft.: Iron oxide inclusion along possible fracture
				@ 166.5 ft.: Thin white bedding
60				@ 167.5 ft. and 168.7 ft.: 80° off vertical fracture
	0	170		@ 171.1 ft.: Fracture surfaces with very minor iron oxide color at 171.1 ft., 171.3 ft. and 171.8 ft.
				@ 171.5 ft. and 172 ft.: Thin white bed
54				@ 173 ft.: Fracture
		175		

BORING_WELL2 CASMALIARIFS.GPJ GEOL.GDT 12/13/10

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Casmalia Resources Superfund Site
Casmalia, California

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Hammer Weight	NA **Drop** NA
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Well Construction Details

Recovery (inches)	PID Reading (ppm)
18	0
	0
60	
	0
60	
	0
54	
	0
60	
	0
60	
	0
60	

Depth (ft.) Sample

175, 180, 185, 190, 195, 200, 205, 210

BENTONITE-PELLET SEAL: 194 to 197 ft.

Medium Aquarium SANDPACK: 197 to 221 ft.

@ 179.5 ft.: 80° off vertical fracture with no oxides
@ 179.7 ft.: Thin white bed

80° off vertical fracture without oxides at 183.2 ft., 183.4 ft., and 184.2 ft.

Subhorizontal fractures at 188.1 ft., 189 ft., 189.3 ft., 189.8 ft., and 190.7 ft.

@ 192.5 ft.: White bedding; subhorizontal fractures at 192.5 ft., 193.2 ft., 195.5 ft., 196.7 ft., 197.5 ft., and 198.2 ft.

@ 200.3 ft.: Fish fossil
@ 201 ft.: White beds
@ 201.3 ft.: Fracture
@ 202.1 ft. and 202.6 ft.: White beds

@ 204.7 ft.: Fracture

@ 207.6 ft. and 207.8 ft.: White beds
Fractures with very minor to no oxidation at 208 ft., 208.3 ft., 209 ft., 209.5 ft., and 210.2 ft.

BORING_WELL2 CASMALIARIFS.GPJ GEOL.GDT 12/13/10

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Casmalia Resources Superfund Site
Casmalia, California

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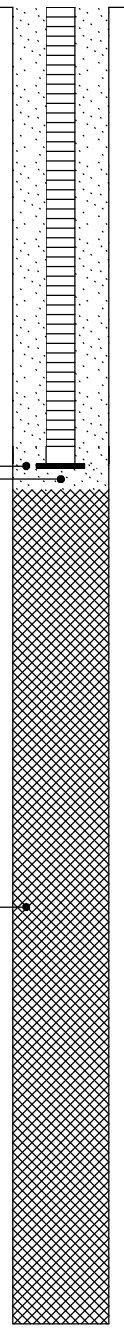
Well Construction Details



Recovery (inches)	PID Reading (ppm)	Depth (ft.)	Sample	Description
	0	210		@ 210.9 ft., 211 ft., 212 ft., 212.6 ft., and 214.3 ft.: Subhorizontal fractures; @ 212.6 ft.: Minor oxides
60				
	0	215		@ 215 ft.: White layer
60				@ 217.2 ft. and 218.5 ft.: Subhorizontal fracture @ 217.7 ft., 218.9 ft., 219.4 ft., and 220.1 ft.: White layers
	0	220		
60				@ 222.7 ft.: White layer @ 223 ft.: Fracture with white oxide flecks
	0	225		
60				@ 228 ft.: Fracture with minor iron oxide @ 228.7 ft. and 231.1 ft.: White layer
	0	230		@ 230 ft.: Subhorizontal fracture with minor iron oxide
54				
	0	235		@ 235 ft.: White layer @ 235.6 ft.: Subhorizontal fracture
60				@ 236.8 - 237.2 ft.: Vertical fracture @ 237.2 ft. and 237.6 ft.: Two subhorizontal fractures
		240		Bottom of boring at 240 ft.

BORING_WELL2 CASMALIARIFS.GPJ GEOL.GDT 12/13/10

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Final Remedial Investigation Report
Casmalia Resources Superfund Site
Casmalia, California

PLATE

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