

# Well Log

Project Number: 2027.01		Boring No.: M-137	
Project Name: Tronox Phase B Investigation		Logged by: Ed Krish	
Drilling Contractor: Boart Longyear		Date Started: 07/27/09	Date Completed: 07/27/09
Drilling Method: Rotary Sonic		Total Depth (ft bgs): 75.0	Depth to Water (ft bgs): 54.0
Borehole Dia. (in): 8.0	Completion: Monument	Surface Elevation (ft MSL):	Top of Casing (ft MSL): 1847.543
Blank Casing: SCH 40 PVC	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots	Filter Pack Type: Silica Sand Size: #10-20	
Casing Dia. (in): 2 From (ft bgs): 0 To: 52	Casing Dia. (in): 2 From (ft bgs): 52 To: 72	Interval (ft bgs) From: 42 To: 75	
Remarks: Boring advanced with 8.0" casing to 75.0'; Neat Cement from 0' to 38'; 3/8" Holeplug from 38' to 42'.			

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
1						<p>SAND (SM): Silty, pale brown (10YR 6/3) and moderate yellowish brown (10YR 5/4); 60% - 70% medium to coarse grained sand with minor finegrained and very coarse grained sand, sub-angular quartz and volcanic fragments; 20% - 30% silt with trace of clay. Up to 10% volcanic granules to 3/8", sub-angular to angular. Trace caliche to 19', then increasing to common @ 23' - 30'.</p> <p>@ 11' - 11.5' cobbles/pebbles to 3", angular volcanics.</p> <p>@ 19' - 23' minor caliche as sand size nodules and coatings, moderate yellowish brown (10YR 5/4), minor coarse grained sub-angular sand and 10% granules to 3/8".</p> <p>23' - 30' Common caliche as nodules to 1", grain coatings and semi-hard cement. Grayish orange (10YR 7/4) in fine to medium grained sand matrix. Caliche up to 50%.</p>				
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14										
15				SM	Qal					
16										
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26										
27										
28										
29										
30										
31						<p>SILT (ML): Dark yellowish orange (10YR 6/6); with 5% - 10% very fine grained sand, 5% clay. Minor scattered caliche nodules to 1" and caliche as grain coatings.</p>				
32										
33				ML	UMCf (MCf1)					
34										

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# Well Log

Project Number: 2027.01	<b>Boring No.: M-137</b>
Project Name: Tronox Phase B Investigation	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 07/27/09 Date Completed: 07/27/09

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36				ML	UMCf (MCf1)	SILT (ML): Dark yellowish orange (10YR 6/6); with 5% - 10% very fine grained sand, 5% clay. Minor scattered caliche nodules to 1" and caliche as grain coatings.				
37										
38										
39										
40				ML	UMCf (MCf1)	SILT, sandy, dark yellowish orange (10YR 6/6); 60% silty and 35% very fine grained sand with 5% clay.				
41										
42										
43										
44										
45										
46						Interbedded SAND, gravelly, clean, and SAND, silty. Gravelly Sand: Dark yellowish brown (10YR 4/2); clean; 80% fine to coarse grained with common medium grains and sparse very coarse grains. Sub-angular to sub-rounded; 20% volcanic granules to 3/8"; sub-angular; water bearing. Occurs 45' - 48', 54' - 56', 64' - 65.5', 70.5' - 72'.				
47										
48										
49										
50						Silty Sand: Moderate yellowish brown (10YR 5/4); 60% very fine to fine grained sand with minor medium grains, 35% silt, 5% clay.				
51										
52										
53										
54						Water @ 54'	▽			
55										
56										
57										
58				SM	UMCf (MCc1)					
59										
60										
61										
62										
63										
64										
65										
66										
67										
68										
69										
70										
71										
72										
73				ML	UMCf (MCf1)	SILT, sandy, clayey, dark yellowish brown (10YR 4/2); 10% - 15% very fine grained sand, 1% - 2% clay. Minor scattered caliche nodules and grain coatings.				
74										

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Total depth = 75.0' @ 14:00, 7/27/09.

# Well Log

Project Number: 2027.01		<b>Boring No.: M-138</b>	
Project Name: Tronox Phase B Investigation		Logged by: Ed Krish	
Drilling Contractor: Boart Longyear		Date Started: 07/28/09	Date Completed: 07/28/09
Drilling Method: Rotary Sonic		Total Depth (ft bgs): 65.0	Depth to Water (ft bgs): 50.0
Borehole Dia. (in): 8.0	Completion: Monument	Surface Elevation (ft MSL):	Top of Casing (ft MSL): 1846.353
Blank Casing: SCH 40 PVC	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots	Filter Pack Type: Silica Sand Size: #10-20	
Casing Dia. (in): 2 From (ft bgs): 0 To: 50.5	Casing Dia. (in): 2 From (ft bgs): 50.5 To: 65.5	Interval (ft bgs) From: 40.5 To: 66	
Remarks: Boring advanced with 8.0" casing to 66.0'; Neat Cement from 0' to 36.5'; 3/8" Holeplug from 36.5' to 40.5'.			

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction	
1						<p>SAND (SM): Silty, gravelly, moderate yellowish brown (10YR 5/2); 65% fine to coarse grained sand with common very coarse grained sand, sub-angular to sub-rounded quartz and volcanic fragments; 10% - 15% volcanic granules to 3/4", minor scattered cobbles to 6"; 20% - 25% silt with trace of clay.</p> <p>@ 26' - 28' abundant caliche as cementation and grain coatings, semi-hard; very pale orange (10YR 8/2).</p> <p>@ 28' - 32' Moderate caliche as nodules and coatings, soft.</p>					
2											
3								0			
4											
5											
6											
7											
8											
9								0			
10											
11											
12											
13											
14											
15											
16				SM	Qal						
17											
18											
19								2.2			
20											
21								0.6			
22											
23											
24								2.9			
25											
26								3.5			
27											
28											
29											
30											
31											
32											
33				ML	UMCf (MCF)	SILT (ML): Sandy, moderate yellowish brown (10YR 5/4); 70% silt; 25% very fine grained sand, 5% clay. Scattered sand sized caliche nodules, soft.					
34											

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# Well Log

Project Number: 2027.01

Boring No.: M-138

Project Name: Tronox Phase B Investigation

Logged by: Ed Krish

Drilling Contractor: Boart Longyear

Date Started: 07/28/09

Date Completed: 07/28/09

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction	
36						<p>SILT (ML): Sandy, moderate yellowish brown (10YR 5/4); 70% silt; 25% very fine grained sand, 5% clay. Scattered sand sized caliche nodules, soft.</p>					
37											
38											
39											
40				ML	UMCf (MCf1)				21.5		
41						<p>Interbedded 20% SAND, gravelly; and SAND, silty, moderate yellowish brown (10YR 5/4). SAND, gravelly; fine to medium grained with minor coarse - very coarse grains, angular to sub-angular; clean to 10% silty; 10% - 15% volcanic granules to 1/4", angular to sub-angular; minor caliche nodules to 1", hard, angular to sub-angular. Gravelly @ 45' - 46.5', 50' - 52', 54.5' - 55', 64' - 65'. SAND Silty; 60% - 65% very fine to fine grained sand with trace 1/8" - 1/4" granules, angular to sub-angular; 30% silt, 5% clay. Very silty 55' - 64'. Water @ 50'</p>					
42											
43											
44											
45											
46									4.2		
47											
48											
49											
50								▽			
51											
52									4.6		
53											
54											
55				SM	UMCf (MCc1)						
56											
57											
58											
59											
60											
61											
62											
63											
64											
65											
66						Total depth = 65.0' @ 11:55, 7/28/09.					
67											
68											
69											
70											
71											
72											
73											
74											

DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10

# Well Log

Project Number: 2027.01		<b>Boring No.: M-139</b>	
Project Name: Tronox Phase B Investigation		Logged by: Dana Brown	
Drilling Contractor: Boart Longyear		Date Started: 08/28/09	Date Completed: 08/28/09
Drilling Method: Rotary Sonic		Total Depth (ft bgs): 60.0	Depth to Water (ft bgs): 29.5
Borehole Dia. (in): 6.0	Completion: Flush Mount	Surface Elevation (ft MSL):	Top of Casing (ft MSL): 1813.193
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 45	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 45 To: 60	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 40 To: 60	
Remarks: Boring advanced with 6.0" casing to 60.0'; Neat Cement from 0' to 36'; 3/8" Holeplug from 36' to 40'.			

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction									
1	SA59-0.5B 07:50			SP-SM	Qal	Poorly Graded Sand with Silt (SP-SM): Pale yellowish brown 10 YR (6/2), very loose, dry. 2% fine sub-rounded gravel to 3/4"+, 88% fine to medium sub-angular sand, 10% non-plastic fines. No odor or staining. Probable fill material with sharp lower contact.		0.0	0.0										
2																			
3																			
4																			
5																			
6	SA59-10B 08:05			SP	Qal	Poorly graded Sand (SP): Grayish orange 10 YR (7/4), very loose, dry. 2% fine sub-rounded gravel to 3/4", 88% fine to medium sub-angular sand, 10% non-plastic fines. No odor or staining.		0.0	0.0										
7																			
8																			
9																			
10																			
11																			
12																			
13															Gravel lens 12.0' - 13.0'; (10/80/10).				
14																			
15																			
16	SA59-25B, SA59009-25B 08:35			SP-SM	Qal	Poorly Graded Sand with Silt (SP-SM): Grayish orange 10 YR (7/4), very loose, dry. 2% fine sub-rounded gravel to 3/4", 88% fine to medium sub-angular sand, 10% non-plastic fines. No odor or staining.		0.0	0.0										
17																			
18															Poorly Graded Sand (Sp): Grayish orange 10 YR (7/4), very loose, dry. 5% fine sub-rounded gravel to 3/4", 90% fine to medium sub-angular sand, 5% non-plastic fines. No odor or staining.				
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20																			
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24																			
25																			
26																			
27																			
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32																			
33																			
34																			

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# Well Log

Project Number: 2027.01

Boring No.: M-139

Project Name: Tronox Phase B Investigation

Logged by: Dana Brown

Drilling Contractor: Boart Longyear

Date Started: 08/28/09

Date Completed: 08/28/09

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36	SA59-36B 09:28			MH	UMCf (MCf1)	Sandy Elastic Silt (MH): Moderate yellowish brown 10 YR (5/4), dense, wet. Trace fine sub-rounded gravel to 3/8", 35% fine sand, 65% moderate-plastic fines. No odor or staining.		0.0	0.0	
37										
38										
39										
40										
41										
42								0.0	0.0	
43								0.2	0.0	
44								0.4	0.0	
45								0.0	0.0	
46								0.0	0.0	
47								0.0	0.0	
48								0.0	0.0	
49								0.0	0.0	
50						Elastic Silt (MH): Moderate yellowish brown 10 YR (5/4), very dense, wet. 5% fine sand, 95% moderate-plastic fines. No odor or staining.		0.0	0.0	
51								0.0	0.0	
52								0.0	0.0	
53								0.0	0.0	
54								0.0	0.0	
55						Sandy Elastic Silt (MH): Moderate yellowish brown 10 YR (5/4), very dense, wet. 20% fine sand, 80% moderate-plastic fines. Up to 2% caliche as nodules to 1/16" and veinlets. No odor or staining.		0.0	0.0	
56								0.0	0.0	
57								0.0	0.0	
58										
59										
60										
61						Total depth 60.0' @ 09:55, 8-28-09				
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DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10



# Well Log

Project Number: 2027.01		<b>Boring No.: M-141</b>	
Project Name: Tronox Phase B Investigation		Logged by: Brendan Mulholland	
Drilling Contractor: Boart Longyear		Date Started: 08/01/09	Date Completed: 08/01/09
Drilling Method: Rotary Sonic		Total Depth (ft bgs): 50.0	Depth to Water (ft bgs): 41.0
Borehole Dia. (in): 8.0	Completion: Flush Mount	Surface Elevation (ft MSL):	Top of Casing (ft MSL): 1797.158
Blank Casing: SCH 40 PVC	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots	Filter Pack Type: Silica Sand Size: #10-20	
Casing Dia. (in): 2 From (ft bgs): 0 To: 37.5	Casing Dia. (in): 2 From (ft bgs): 37.5 To: 47.5	Interval (ft bgs) From: 30 To: 50	
Remarks: Boring advanced with 10.0" casing to 50.0'; Neat Cement from 0' to 26'; 3/8" Holeplug from 26' to 30'.			

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
1				AC		Asphaltic concrete (AC)				
2				SP	Qal	Poorly graded sand (SP): Very dark brown 7.5 YR (5/2), moist. 10% fine to coarse gravel, 85% coarse sand, 5% non-plastic fines.		0.5		
3						Silty Sand (SM): Yellowish brown 10 YR (5/4), moist. 5% fine to coarse gravel, 70% medium to coarse sand, 25% non-plastic fines.		0.0		
4								0.0		
5								0.0		
6								0.0		
7								0.0		
8								0.0		
9								0.0		
10								0.0		
11								0.0		
12								0.0		
13								0.0		
14								0.0		
15								0.0		
16								0.0		
17								0.1		
18								0.0		
19				SM	Qal	17.5' - 18.0' Volcanic cobbles.		0.0		
20								0.0		
21								0.0		
22								0.0		
23								0.0		
24								0.0		
25								0.0		
26								0.0		
27								0.0		
28								0.0		
29								0.0		
30								0.0		
31								0.0		
32								0.0		
33								0.0		
34								0.0		

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# Well Log

Project Number: 2027.01

**Boring No.: M-141**

Project Name: Tronox Phase B Investigation

Logged by: Brendan Mulholland

Drilling Contractor: Boart Longyear

Date Started: 08/01/09

Date Completed: 08/01/09

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36				SM	Qal	Silty Sand (SM): Yellowish brown 10 YR (5/4), moist. 5% fine to coarse gravel, 70% medium to coarse sand, 25% non-plastic fines.  Wet @ 41.0'	▽	0.1		
37		0.0								
38		0.0								
39				ML	UMCf (MCf)	Silt (ML): Yellowish brown 10 YR (5/4), wet. 5% fine sand, 95% non-plastic fines.  @ 44.0' Color change to dark yellowish brown 10 YR (4/4).		0.1		
40		0.0								
41		0.0								
42		0.0								
43		0.0								
44				CL	UMCf (MCf)	Lean Clay (CL): Yellowish brown 10 YR (5/4), moist to wet. 5% fine sand, 95% moderate to high-plastic fines.		0.0		
45		0.0								
46								0.0		
47								0.0		
48								0.0		
49								0.0		
50										
51						Total depth 50.0' @ 10:30, 8-1-09				
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53										
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# Well Log

Project Number: 2027.01		<b>Boring No.: M-143</b>	
Project Name: Tronox Phase B Investigation		Logged by: Dana R. Brown	
Drilling Contractor: Boart Longyear		Date Started: 09/03/09	Date Completed: 09/03/09
Drilling Method: Rotary Sonic		Total Depth (ft bgs): 45.0	Depth to Water (ft bgs): 32.0
Borehole Dia. (in): 6.0	Completion: Monument	Surface Elevation (ft MSL):	Top of Casing (ft MSL): 1813.132
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 35	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 35 To: 45	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 30 To: 45	
Remarks: Boring advanced with 6.0" casing to 45.0'; Neat Cement from 0' to 26'; 3/8" Holeplug from 26' to 30'.			

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
1	SA204-0.5B 11:10			SM	Qal	Silty Sand (SM): Grayish orange 10 YR (7/4), loose to very loose, dry. 10% fine sub-angular gravel to 5/8"+, 55% fine to medium sub-angular sand, 25% non-plastic fines. No odor or staining.				
2										
3										
4										
5										
6										
7	SA204-10B, SA204009-10B 11:23			SM	Qal	Silty Sand (SM): Dark yellowish orange 10 YR (6/6), medium dense, dry to damp. 5% fine sub-angular gravel to 1/2"+, 70% fine to medium sub-angular sand, 25% non-plastic fines. No odor or staining.	9.2	0.8		
8										
9										
10										
11										
12										
13										
14										
15										
16										
17	SA204-30B 11:56			SM	Qal	Gravel lens @ 10.0', 10% sub-angular to angular gravel to 1/2".	1.4	0.2		
18										
19										
20										
21										
22										
23										
24										
25										
26										
27				SM	Qal	Silty Sand (SM): Dark yellowish orange 10 YR (6/6), to Light brown 5 YR (5/6) at depth. medium dense, damp. 5% fine sub-angular gravel to 1"-, 65% fine to medium sub-angular sand, 30% non-plastic fines. No odor or staining.	0.7	0.0		
28										
29										
30										
31						Massive caliche 30.0' - 32.5'. Color change to light brown 5 YR (5/6) @ 30.0'.	6.1	0.4		
32										
33										
34										
				ML	UMCf (MCf)	Sandy Silt (ML): Light brown 5 YR (5/6), stiff, wet. 30% fine sub-angular sand, 70% non-plastic fines. No odor or staining.	1.6	0.0		
				ML	UMCf (MCf)					

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# Well Log

Project Number: 2027.01

**Boring No.: M-143**

Project Name: Tronox Phase B Investigation

Logged by: Dana R. Brown

Drilling Contractor: Boart Longyear

Date Started: 09/03/09

Date Completed: 09/03/09

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36	SA204-45B 12:47			ML	UMCf (MCl)	Sandy Silt (ML): Moderate yellowish brown 10 YR (5/4), medium-stiff. Trace fine sub-rounded gravel to 5/8"+, 35% fine sub-angular sand, 65% non-plastic fines. No odor or staining.	2.8	0.0		
37										
38										
39										
40										
41										
42										
43										
44										
45										
46				ML	UMCf (MCl)	Sandy Silt (ML): Light brown 5 YR (5/6), stiff, wet. Trace sub-angular gravel to 3/*"+, 25% fine sub-angular sand, 75% non-plastic fines. Caliche as grain coatings on gravel clasts, nodules to 1/16", and rare veinlets. No odor or staining.	0.5	0.0		
47						Total depth 45.0' @12:49, 9-3-09	0.5	0.0		
48										
49										
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# Well Log

Project Number: 2027.01		<b>Boring No.: M-144</b>	
Project Name: Tronox Phase B Investigation		Logged by: Dana R. Brown	
Drilling Contractor: Boart Longyear		Date Started: 09/08/09	Date Completed: 09/08/09
Drilling Method: Rotary Sonic		Total Depth (ft bgs): 45.0	Depth to Water (ft bgs): 32.0
Borehole Dia. (in): 6.0	Completion: Flush Mount	Surface Elevation (ft MSL):	Top of Casing (ft MSL): 1813.305
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 35	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 35 To: 45	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 30 To: 45	
Remarks: Boring advanced with 10.0" casing to 45.0'; Neat Cement from 0' to 26'; 3/8" Holeplug from 26' to 30'.			

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction	
1	SA135-0.5B 08:02					Silty Sand (SM): Pale brown 5 YR (5/2), very loose, dry. 2% fine sub-angular gravel to 1"-, 75% fine - medium sub-angular sand, 23% fine sub-angular silt. No odor or staining.		3.2	2.0		
2											
3	SA135-10B, SA135009-10B 08:24				SM	Qal	Gravel lens @ 8.0' (10/65/25).		11.9	1.2	
4											
5											
6											
7											
8											
9											
10											
11	SA135-25B 09:25					Gravel lens @ 15.0' (8/65/27).		32.8	3.2		
12											
13											
14											
15											
16											
17	SM	Qal			Silty Sand (SM): Dark yellowish brown 10 YR (4/2), very loose, dry. 2% - 5% fine sub-angular gravel to 1"-, 70% fine sub-angular sand, 25% non-plastic fines. No odor or staining.		29.4	2.6			
18											
19											
20											
21	SM	Qal			Much caliche 23.5' - 26.0'		35.4	2.4			
22											
23	ML	UMCf (MCf)					47.8	1.7			
24											
25	ML	UMCf (MCf)					13.3	1.4			
26											
27	ML	UMCf (MCf)					13.6	1.3			
28											
29	ML	UMCf (MCf)					29.7	1.5			
30											
31	ML	UMCf (MCf)					59.1	2.0			
32											
33	ML	UMCf (MCf)					21.4	2.3			
34											

DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10

# Well Log

Project Number: 2027.01

**Boring No.: M-144**

Project Name: Tronox Phase B Investigation

Logged by: Dana R. Brown

Drilling Contractor: Boart Longyear

Date Started: 09/08/09

Date Completed: 09/08/09

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36	SA135-37B 09:51			ML	UMCf (MCf)	Silt with Sand (ML): Light brown 5 YR (5/6), stiff, wet. Trace fine sub-rounded gravel to 3/8"+, 20% fine sub-angular sand, 80% non-plastic fines. Rare caliche nodules to 1/16". No odor or staining.		9.1	0.4	
37								11.5	0.0	
38								16.0	0.2	
39								19.5	0.4	
40								18.6	0.6	
45	Total depth 45.0' @ 09:55, 9-8-09									
46										
47										
48										
49										
50										
51										
52										
53										
54										
55										
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74										

DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10

# Well Log

Project Number: 2027.01		Boring No.: M-145	
Project Name: Tronox Phase B Investigation		Logged by: Dana R. Brown	
Drilling Contractor: Boart Longyear		Date Started: 08/31/09	Date Completed: 08/31/09
Drilling Method: Rotary Sonic		Total Depth (ft bgs): 60.0	Depth to Water (ft bgs): 34.8
Borehole Dia. (in): 6.0	Completion: Flush Mount	Surface Elevation (ft MSL):	Top of Casing (ft MSL): 1812.234
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 45	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 45 To: 60	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 40 To: 60	
Remarks: Boring advanced with 10.0" casing to 60.0'; Neat Cement from 0' to 36'; 3/8" Holeplug from 36' to 40'.			

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction			
1	SA68-0.5B 06:41			Fill		Fill Material (0.0' - 9.8'), Silty Sand (SM): Very pale orange 10 YR (8/2), very loose, dry to damp. 2% (up to 5% locally) fine sub-angular gravel to 1"+, 65% fine to medium sub-angular sand, 32% - 35% non-plastic fines. Stratified locally in fine lifts. No odor or staining.		2.0	0.3				
2								5.2	0.5				
3	SA68-10B 07:22			Fill		Silty Sand (SM): Light brown 5 YR (5/6), loose, dry. 2% fine sub-angular gravel to 3/4", 88% fine to medium sub-angular sand, 10% non-plastic fines. No odor or staining.		7.0	0.3				
4								4.0	0.2				
5								SP	Qal		Poorly Graded Sand (SP): Grayish orange 10 YR (7/4) to light brown 5 YR (5/6), loose, dry to damp. 2% fine sub-angular gravel to 1/2", 94% fine to medium sub-angular sand, 4% non-plastic fines.	4.3	0.3
6												0.4	0.0
7								SM	Qal		Silty Sand (SM): Dark yellowish orange 10 YR (6/6), medium dense, damp to moist. 5% sub-angular gravel to 1"-, 65% fine to medium sub-angular sand, 30% non to moderate-plastic fines. No odor or staining. Probable fill material.	0.4	0.0
8												0.4	0.0
9								SP-SM	Qal		Poorly Graded Sand (SP) to Poorly Graded Sand with Silt (SP-SM): Grayish orange 10 YR (7/4) to light brown 5 YR (5/6), loose, dry to damp. 2% to 5% fine sub-angular gravel to 1/2", 85% - 95% fine to medium sub-angular sand, 5% -10% non-plastic fines. Some caliche as grain coatings and veinlets. No odor or staining.	0.3	0.0
10												0.2	0.0
11	0.4	0.0											
12	0.4	0.0											
13	0.3	0.0											
14	0.3	0.0											
15	SA68-25B, SA68009-25B 07:55			SM	Qal	Silty Sand (SM): Dark yellowish orange 10 YR (6/6), medium dense, damp to moist. 5% sub-angular gravel to 1"-, 65% fine to medium sub-angular sand, 30% non to moderate-plastic fines. No odor or staining.		0.9	0.0				
16								0.9	0.0				
17								0.6	0.0				
18	SM	Qal		SM	Qal	Silty Sand (SM): Light brown 5 YR (5/6), medium dense to loose, damp to moist. Trace sub-rounded gravel to 3/8"+, 65% fine sand, 35% non-plastic fines. No odor or staining.		0.6	0.0				
19								0.6	0.0				
20	22.5' - 23.5' Massive caliche.							0.4	0.0				
21								0.3	0.0				
22								0.3	0.0				
23								0.9	0.0				
24								0.9	0.0				
25								0.9	0.0				
26								0.6	0.0				
27								0.6	0.0				
28								0.6	0.0				
29								0.6	0.0				
30	▽							0.9	0.0				
31								0.9	0.0				
32								0.9	0.0				
33								0.9	0.0				
34								0.9	0.0				

DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10

# Well Log

Project Number: 2027.01

**Boring No.: M-145**

Project Name: Tronox Phase B Investigation

Logged by: Dana R. Brown

Drilling Contractor: Boart Longyear

Date Started: 08/31/09

Date Completed: 08/31/09

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction	
36	SA68-36B 08:25			SM	Qal						
37				MH	UMCf (MCfl)	Sandy Elastic Silt (MH): Light brown 5 YR (5/6), stiff, wet. Trace fine sub-rounded gravel to 3/8"+, 30% fine sand, 70% moderate-plastic fines. No odor or staining.	0.6	0.3			
38								0.0	0.1		
39											
40								Elastic Silt (MH): Moderate yellowish brown 10 YR (5/4), stiff to very stiff locally, wet. 20% fine sub-angular sand, 80% non to moderate-plastic fines. No odor or staining.	3.1	0.0	
41											
42									1.2	0.1	
43											
44									0.6	0.0	
45											
46						1.0	0.0				
47											
48											
49						Sandy Elastic Silt (MH): Moderate yellowish brown 10 YR (5/4), medium stiff to stiff locally, wet. Trace to 2% fine sub-angular gravel to 1/2", 35% fine sub-angular sand, 63% non to moderate-plastic fines. No odor or staining.	0.3	0.0			
50											
51							0.3	0.0			
52											
53							0.1	0.0			
54						Elastic Silt (MH): Moderate yellowish brown 10 YR (5/4), stiff to very stiff locally, wet. 20% fine sub-angular sand, 80% non to moderate-plastic fines. No odor or staining.	0.6	0.0			
55											
56							1.8	0.0			
57											
58							0.7	0.0			
59											
60							1.2	0.0			
61	Total depth 60.0' @ 09:20, 8-31-09										
62											
63											
64											
65											
66											
67											
68											
69											
70											
71											
72											
73											
74											

DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10

# Well Log

Project Number: 2027.01		<b>Boring No.: M-146</b>	
Project Name: Tronox Phase B Investigation		Logged by: Dana R. Brown	
Drilling Contractor: Boart Longyear		Date Started: 09/01/09	Date Completed: 09/01/09
Drilling Method: Rotary Sonic		Total Depth (ft bgs): 50.0	Depth to Water (ft bgs): 31.0
Borehole Dia. (in): 6.0	Completion: Monument	Surface Elevation (ft MSL):	Top of Casing (ft MSL): 1812.481
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 40	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 40 To: 50	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 35 To: 50	
Remarks: Boring advanced with 6.0" casing to 50.0'; Neat Cement from 0' to 31'; 3/8" Holeplug from 31' to 35'.			

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction									
1	SA133-0.5B 09:50			SM	Qal	Silty Sand (SM): Pale yellowish brown 10 YR (6/2), very loose to loose, dry. 10% fine angular to sub-angular gravel to 3/8"+, 60% fine to medium sub-angular sand, 30% non-plastic fines. Probable fill material, many fractured angular gravel clasts.		1.4	0.7										
2								4.1	0.6										
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10	SA133-10B 10:05			SM	Qal	Gravel lens 9.0' - 10.0', 10% angular to sub-angular gravel to 1/2".  @ 11.0' color change to very pale orange 10 YR (8/2).		0.9	0.2										
11								0.9	0.2										
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19	SA133-20B 10:25			SM	Qal	Silty Sand (SM): Dark yellowish brown 10 YR (4/2), very loose, dry. 65% fine sub-angular sand, 30% non-plastic fines. No odor or staining.		0.9	0.6										
20								0.9	0.3										
21																			
22																			
23																			
24																			
25																			
26																			
27																			
28	SA133-31B, -BMS, -BMSD 10:50			ML	UMCf (MCf1)	Sandy Silt (ML): Dark yellowish brown 10 YR (6/6), medium stiff, wet. Trace sub-angular gravel to 3/8"+, 25% fine to medium sub-angular sand, 75% non-plastic fines. No odor or staining.		▽	0.7	0.5									
29																			
30																			
31																			
32																			
33																			
34																			
34													ML	UMCf (MCf1)			11.6	0.6	

DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10



# Well Log

Project Number: 2027.01

**Boring No.: M-146**

Project Name: Tronox Phase B Investigation

Logged by: Dana R. Brown

Drilling Contractor: Boart Longyear

Date Started: 09/01/09

Date Completed: 09/01/09

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36						Silt with Sand (ML): Moderate yellowish brown 10 YR (5/4), stiff to medium-stiff, wet. Trace sub-angular coarse sand/fine gravel to 3/8", 15% fine sub-angular sand, 85% non-plastic fines. Trace caliche as nodules to 1/16". No odor or staining.		4.4	0.7	
37								12.6	1.0	
38										
39								25.0	1.5	
40										
41										
42				ML	UMCf (MCf)			15.7	1.1	
43										
44								12.9	0.9	
45										
46							0.8	0.5		
47										
48							14.0	0.8		
49										
50										
51						Total depth 50.0' @ 11:20, 9-1-09		0.1	0.4	
52										
53										
54										
55										
56										
57										
58										
59										
60										
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73										
74										

DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10

# Well Log

Project Number: 2027.01		<b>Boring No.: M-147</b>	
Project Name: Tronox Phase B Investigation		Logged by: Dana R. Brown	
Drilling Contractor: Boart Longyear		Date Started: 08/20/09	Date Completed: 08/20/09
Drilling Method: Rotary Sonic		Total Depth (ft bgs): 40.0	Depth to Water (ft bgs): 29.0
Borehole Dia. (in): 6.0	Completion: Monument	Surface Elevation (ft MSL):	Top of Casing (ft MSL): 1781.211
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 25	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 25 To: 40	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 20 To: 40	
Remarks: Boring advanced with 6.0" casing to 40.0'; Neat Cement from 0' to 16'; 3/8" Holeplug from 16' to 20'.			

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
1	SA139-0.5B 06:55					Silty Sand (SM): Pale yellowish brown 10 YR (6/2), very loose to loose, dry. 10% fine angular to sub-angular gravel to 3/8"+, 60% fine to medium sub-angular sand, 30% non-plastic fines. Probable fill material, many fractured angular gravel clasts.		2.4	0.4	
2										
3	SA139-10B 07:15				SM	Qal		10.8	0.1	
4										
5										
6										
7										
8										
9										
10										
11	SA139-25B, SA139009-25B 07:30					Gravel lens 9.0' - 10.0', 10% angular to sub-angular gravel to 1/2". @ 10.0' color change to very pale orange 10 YR (8/2).	63.7	0.1		
12										
13										
14										
15										
16										
17										
18										
19										
20										
21						Silty Sand (SM): Dark yellowish brown 10 YR (4/2), very loose, dry. 65% fine sub-angular sand, 30% non-plastic fines. No odor or staining.	218	0.5		
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										

DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10

# Well Log

Project Number: 2027.01

**Boring No.: M-147**

Project Name: Tronox Phase B Investigation

Logged by: Dana R. Brown

Drilling Contractor: Boart Longyear

Date Started: 08/20/09

Date Completed: 08/20/09

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36	SA139-35B 07:55			ML	UMCf (MCl)	Silt with Sand (ML): Moderate yellowish brown 10 YR (5/4), stiff to medium-stiff, wet. 2% fine sub-rounded gravel to 5/8"+, 15% fine sub-angular sand, 83% non-plastic fines. Trace caliche as nodules to 1/16". No odor or staining.		19.5	0.4	
37								180	1.7	
38										
39										
40										
41						Total depth 40.0' @ 08:15, 8-20-09				
42										
43										
44										
45										
46										
47										
48										
49										
50										
51										
52										
53										
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70										
71										
72										
73										
74										

DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10

# Well Log

Project Number: 2027.01		<b>Boring No.: M-148</b>	
Project Name: Tronox Phase B Investigation		Logged by: Dana R. Brown	
Drilling Contractor: Boart Longyear		Date Started: 09/10/09	Date Completed: 09/11/09
Drilling Method: Rotary Sonic		Total Depth (ft bgs): 50.0	Depth to Water (ft bgs): 42.5
Borehole Dia. (in): 6.0	Completion: Monument	Surface Elevation (ft MSL):	Top of Casing (ft MSL): 1800.827
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 30	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 35 To: 50	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 30 To: 50	
Remarks: Boring advanced with 6.0" casing to 50.0'; Neat Cement from 0' to 26'; 3/8" Holeplug from 26' to 30'.			

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
1	SA124-0.5B 13:02	[Cross-hatched]	[Cross-hatched]	FILL		Manganese tailings (Fill): Dark gray N3, very loose to medium-dense locally, dry. 99% very fine grained dust, 1% fine gravel or coarse sand floating in tailings matrix. Locally accumulated in layers up to 1/32' thick.		0.0	0.0	[Cross-hatched]
2										
3										
4										
5										
6										
7										
8										
9										
10										
11	SA124-10B, SA124009-10B 13:35	[Dotted]	[Dotted]	SM	Qal	Silty Sand (SM): Dark yellowish orange 10 YR (6/6), medium dense to loose, damp to dry. 5% fine sub-angular gravel to 1"-, 65% fine to medium sub-angular sand, 30% non-plastic fines. No odor or staining.		0.2	0.0	[Dotted]
12										
13										
14										
15										
16										
17										
18										
19										
20										
21	SA124-25B 07:04	[Dotted]	[Dotted]	SM	Qal	Gravel lens @ 22.0' (10/70/20).		0.1	0.0	[Dotted]
22										
23										
24										
25										
26										
27										
28										
29										
30										
31		[Dotted]	[Dotted]			Gravel lens @ 27.0' (10/75/15).		0.4	0.0	[Dotted]
32										
33										
34										

DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10

# Well Log

Project Number: 2027.01

**Boring No.: M-148**

Project Name: Tronox Phase B Investigation

Logged by: Dana R. Brown

Drilling Contractor: Boart Longyear

Date Started: 09/10/09

Date Completed: 09/11/09

Depth (ft)	Sample I.D. Sample Time	Sample Type	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36	SA124-42B 07:39			SM	Qal	Silty Sand (SM): Dark yellowish orange 10 YR (6/6), medium dense to loose, damp to dry. 5% fine sub-angular gravel to 1"-, 65% fine to medium sub-angular sand, 30% non-plastic fines. No odor or staining.	▽	0.9	0.0	
37								1.3	0.1	
38				ML	UMCf (MCf)	Sandy Silt (ML): Pale brown 5 YR (5/2), medium-stiff to loose, damp. 35% fine to medium sand, 65% non-plastic fines. Some caliche nodules to 3/8". No odor or staining.		0.1	0.0	
39								0.3	0.0	
40				MH	UMCf (MCf)	Sandy Elastic Silt (MH): Moderate yellowish brown 10 YR (5/4), medium stiff, damp to wet. 25% fine sand, 75% non to moderate-plastic fines. Rare caliche nodules to 1/16". No odor or staining.		0.7	0.0	
41								0.1	0.0	
42								0.2	0.0	
43								0.7	0.0	
44								0.1	0.0	
45								0.2	0.0	
46	0.7	0.0								
47	0.7	0.0								
48	Total depth 50.0' @ 08:20, 9-11-09									
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
59										
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74										

DRB-ENVIRO WELL LOG 2027.01.GPJ 1/13/10