AECOM
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Phone 404.965.9600
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Ms. Addie Walker
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

May 15, 2014

Dear Ms. Walker,

Subject: Performance Monitoring Wells Installation and Baseline Results
Auriga, Spartanburg Facility
BoW Site ID# 00225, VCC 13-5841-RP
AECOM Project No. 60280417

Chloroform remediation activities approved in South Carolina Department of Health and Environmental Control (DHEC) letters dated September 5th and 9th, 2013 have been initiated. The approved plan included installation of performance monitoring wells at 14 locations. Nine performance monitoring locations were established on the north side of Interstate 85. Five performance monitoring locations were established south of Interstate 85 on the property at 600 Bruckner Road. Well installation activities and baseline monitoring activities have been completed. The activities completed to date are summarized below.

Performance monitoring well installation was started on December 3, 2013 and completed on March 31, 2014. A total of 24 performance monitoring wells were installed. A saprolite performance monitoring well was completed at each of the 14 locations. A paired bedrock boring was also completed at each of the 14 locations. At four of the 14 locations the bedrock boring was dry and no well was installed. Bedrock performance monitoring wells were installed at the remaining 10 locations. All 28 locations, including the 4 dry bedrock borings, were surveyed on April 2, 2014. The locations are presented on Figure 1.

Three of the four dry bedrock locations were on the DMT area side of Interstate 85. These locations were designated RW-125, RW-131, and RW-135. The remaining dry bedrock location was identified as RW-117 and is located within the 600 Bruckner property. The lack of water producing fractures within these locations is consistent with intermittent competent rock areas.

Well construction details are presented on Table 1. Complete well construction logs are presented in Attachment 1 of this letter.

As part of the well construction activities, AECOM completed two packer tests to provide vertical delineation of the chloroform plume. One packer test was completed at location RW-129 on the DMT side of Interstate 85. The second packer test was completed at location RW-115 on the 600 Bruckner Road property. The results of the packer tests are summarized in the tables below. The sample screen intervals are presented in feet below ground surface (feet bgs). The chloroform results are presented in milligrams per liter (mg/L).

Packer Tests Results – Location RW-129

	Depth (feet bgs)	Chloroform Result (mg/L)
First Interval	88.5 - 105	3.88
Second Interval	105 - 120	3.29
Third Interval	120 -135	DRY
Fourth Interval	135 - 150	1.09
Fifth Interval	150-165	DRY
Sixth Interval	165 - 180	DRY

Packer Test Results – Location RW-115

	Depth (feet bgs)	Chloroform Result (mg/L)
First Interval	75-90	2.45
Second Interval	90-105	DRY
Third Interval	105 - 120	DRY

At each packer test location two consecutive dry intervals were identified. Areas of competent rock are frequently encountered and create hydraulic barriers to vertical migration. The surveyed ground surface elevation of RW-129 is 751.96 feet. The surveyed ground surface elevation of RW-115 is 714.80 feet. Based on these results the vertical delineation was determined to be approximately 150 feet bgs on the DMT area and 90 feet bgs in the 600 Bruckner Road area. This depth was used to support selection of bedrock well screening depths, with consideration that the delineation elevation could potentially decrease as the ground elevation declines.

Baseline performance monitoring samples were collected between March 31 and April 3, 2014. The chloroform results are summarized on Table 2. The data on Table 2 is organized by well pairs. The chloroform data for saprolite wells is presented on Figure 2. The chloroform data for bedrock wells is presented on Figure 3.

The primary observation of this baseline data is that the results are consistent with the previous direct push evaluations. These results define an effective baseline reference for demonstration of remediation results across the established horizontal delineation of the plume in both saprolite and bedrock.

One significant observation is made regarding the saprolite and bedrock data on the 600 Bruckner Road property. Saprolite well MW-112 is located near Bruckner Road and near the location of DPT positions OSS-12-01 and OSS-12-02. The chloroform results in samples from these direct push locations were 2.03 and 2.53 mg/L. The chloroform result for the saprolite well MW-112 was 2.00 mg/L, consistent with the direct push results for the area. The paired bedrock well at this location is RW-113. As shown on Table 1, the distance between the bottom of the MW-112 screen and the top of the RW-113 screen is only 21.3 feet. However, the chloroform result for the sample from the bedrock well was non-detect (<0.005 mg/L). This combination of results shows that the bedrock in this area is competent and serves as a barrier to vertical migration. The next bedrock well location along the creek to the east is RW-117. This location was determined to be dry and no well was

installed. Combined with the results for RW-113, the data indicate that chloroform on the western side of the property at 600 Bruckner Road is limited to saprolite.

Well pairs to the north and east on the 600 Bruckner Road property reported detections of chloroform in both saprolite and bedrock. These results are consistent with historic data from wells RW-108 and MW-109. Chloroform in bedrock in these areas is expected to flow in a southeasterly direction, more directly toward the Pacolet River. Based on both the packer test results and the bedrock barrier identified to the west, when chloroform is detected in bedrock the depth is expected to be limited.

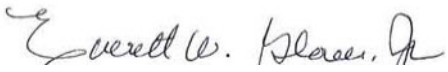
A complete analytical summary is presented in Table 3. Complete lab reports are also attached to this report. All samples were analyzed for volatile organics. In addition to chloroform there were three detections of cis-1,2-dichloroethene and two detections each of methylene chloride and tetrachloroethene. Each of these detections were within the former DMT vicinity on the plant property and are consistent with detections previously noted in routine monitoring activities.

In addition, the groundwater samples from the 600 Bruckner Road property were analyzed for 1,4-dioxane and semivolatile organics, including DowTherm A™ components (1,1-diphenyl and biphenyl ether). 1,4-Dioxane was detected three times in wells consistent with the detections previously noted in direct push samples. DowTherm A™ components were not detected. The only semivolatile organics detected were phthalates. These compounds are commonly encountered and are also common laboratory contaminants.

Injection activities are underway and are expected to be complete in late May. The annual June monitoring event will be scheduled soon. The first quarterly post-injection monitoring event will be completed in September. The results of the June 2014 event and four quarterly post injection events will be compared to the baseline results presented in this report. A review and assessment of the result is expected to be complete in late 2015.

If you have questions, please contact us at 404.965.9600.

Sincerely,



Bryon Dahlgren, PE
Project Manager

Everett W. Glover, Jr., PE
Senior Program Manager

Table 1
Performance Monitoring Well Construction Summary
April 2014
Auriga Spartanburg Facility
AECOM Project No. 60280417

Well Name	Zone	Date Started	Date Completed	Total Depth (ft)	Screen Interval (ft)
BRUCKNER ROAD LOCATIONS					
MW-112	Saprolite	12/4/2013	12/5/2013	39	28.7-38.7
RW-113	Bedrock	3/19/2014	3/26/2014	70	60-70
MW-114	Saprolite	12/3/2013	12/4/2013	56.6	46.3-56.3
RW-115	Bedrock	2/27/2014	3/26/2014	88.8	78.5-88.5
MW-116	Saprolite	12/6/2013	12/12/2013	31.3	21.3-31.3
RW-117	Bedrock	3/10/2014	3/26/2014	DRY - not installed	
MW-118	Saprolite	12/10/2013	12/13/2013	44.3	34.3-44.3
RW-119	Bedrock	3/6/2014	3/26/2014	90.3	80-90
MW-120	Saprolite	12/5/2013	12/13/2013	55	44.7-54.7
RW-121	Bedrock	3/4/2014	3/26/2014	80	75-80
DMT AREA LOCATIONS					
MW-122	Saprolite	12/11/2013	12/11/2013	57.5	47.2-57.2
RW-123	Bedrock	1/23/2014	3/28/2014	137.3	127-137
MW-124	Saprolite	12/11/2013	12/12/2013	59.9	49.6-59.6
RW-125	Bedrock	1/21/2014	1/22/2014	DRY - not installed	
MW-126	Saprolite	12/12/2013	12/12/2013	49.5	39.2-49.2
RW-127	Bedrock	1/9/2014	3/31/2014	92.7	82.4-92.4
MW-128	Saprolite	12/16/2013	12/17/2013	60.3	50.1-60.1
RW-129	Bedrock	2/3/2014	3/25/2014	150	134.7-144.7
MW-130	Saprolite	12/17/2013	12/17/2013	60.7	50.5-60.5
RW-131	Bedrock	1/27/2014	3/25/2014	DRY - not installed	
MW-132	Saprolite	12/18/2013	12/18/2013	65.2	54.9-64.9
RW-133	Bedrock	2/6/2014	3/25/2014	117.3	107-117
MW-134	Saprolite	12/19/2013	12/19/2013	75.4	65.1-75.1
RW-135	Bedrock	2/17/2014	2/19/2014	DRY - not installed	
MW-136	Saprolite	12/13/2013	12/13/2013	60.5	50.2-60.2
RW-137	Bedrock	2/17/2014	2/26/2014	107.3	97-107
MW-138	Saprolite	12/13/2013	12/16/2013	59.6	49.3-59.3
RW-139	Bedrock	2/21/2014	2/26/2014	97.8	87.5-97.5

Table 2
Baseline Performance Monitoring Chloroform Results
April 2014
Auriga Spartanburg Facility
AECOM Project No. 60280417

600 Bruckner Road			
MW-112	2.00	**RW-113**	<0.005
MW-114	1.66	**RW-115**	2.57
MW-116	0.845	**RW-117**	DRY
MW-118	0.697	**RW-119**	0.214
MW-120	0.149	**RW-121**	0.115
DMT			
MW-122	0.0308	**RW-123**	0.0235
MW-124	0.798	**RW-125**	DRY
MW-126	2.00	**RW-127**	1.06
MW-128	0.0077	**RW-129**	0.575
MW-130	0.0398	**RW-131**	DRY
MW-132	<0.005	**RW-133**	0.0492
MW-134	5.29	**RW-135**	DRY
MW-136	<0.005	**RW-137**	0.243
MW-138	0.148	**RW-139**	0.958

All Results in mg/L

Table 3
Summary of Baseline Performance Monitoring Results
April 2014
Auriga Spartanburg Facility
AECOM Project No. 60280417

Parameter	Unit	MW-112 4/1/2014	MW-114 4/2/2014	MW-114 Dup 4/2/2014	MW-116 4/1/2014	MW-118 4/1/2014	MW-120 4/2/2014	MW-122 4/3/2014	MW-124 4/3/2014	MW-126 4/3/2014
Volatile Organics and 1,4-Dioxane										
chloroform	mg/L	2.00	1.66	1.49	0.845	0.697	0.149	0.0308	0.798	2.00
cis-1,2-dichloroethene	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0183	<0.005	<0.005
1,4-dioxane	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.0023	NA	NA	NA
methylene chloride	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
tetrachloroethene	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0067	0.0054
Semivolatile Organics										
bis(2-ethylhexyl)phthalate	mg/L	<0.006	<0.006	<0.006	<0.006	0.0068	<0.006	NA	NA	NA
di-n-octyl phthalate	mg/L	<0.01	0.0127	0.0129	<0.01	0.02	<0.01	NA	NA	NA
Field and Natural Attenuation Parameters										
alkalinity	mg/L	21.5	16.3	15.1	23.6	11.7	14.8	15.8	<5	7.9
chloride	mg/L	2.5	7.2	7.2	5.1	3.3	2.8	3.3	7	13.9
dissolved oxygen	mg/L	5.5	6.07	6.07	3.6	6.41	4.51	4.59	5.83	6.52
ferrous Fe	mg/L	0	0.17	0.17	0.06	0.11	0.02	0.08	0.06	0.04
groundwater elevation	feet MSL	687.60	683.20	683.20	680.30	674.05	665.08	727.56	725.74	718.50
manganese (dissolved)	mg/L	<0.005	0.0158	0.015	0.19	0.034	0.0361	0.109	0.0511	0.182
ORP	mV	152.9	153.3	153.3	139.8	149.3	150	219.8	238.4	185.8
pH	su	5.12	4.95	4.95	4.74	4.81	4.88	5.11	4.98	4.15
specific conductance	umhos/cm	0.118	0.123	0.123	0.134	0.074	0.073	0.053	0.062	0.168
temperature	degrees C	15.74	16.95	16.95	18.66	19.11	21.92	20.68	21.8	18.2
total organic carbon	mg/L	1.9	<1	<1	<1	<1	<1	<1	<1	<1
turbidity	NTU	0.17	5.03	5.03	1.68	3.57	4.11	7.03	9.33	0.01

NA - Not Analyzed
degrees C - degress Celsius
feet MSL - feet above mean sea level
mg/L - milligrams per liter
mV - millivolts
NTU = nephelometric turbidity units
su - standard units
umhos/cm - micromhos/cm

Table 3
Summary of Baseline Performance Monitoring Results
April 2014
Auriga Spartanburg Facility
AECOM Project No. 60280417

Parameter	Unit	MW-128 4/2/2014	MW-130 4/1/2014	MW-132 4/2/2014	MW-132 Dup 4/2/2014	MW-134 4/2/2014	MW-136 3/31/2014	MW-138 3/31/2014	RW-113 4/1/2014	RW-115 4/2/2014
Volatile Organics and 1,4-Dioxane										
chloroform	mg/L	0.0077	0.0398	<0.005	<0.005	5.29	<0.005	0.148	<0.005	2.57
cis-1,2-dichloroethene	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,4-dioxane	mg/L	NA	NA	NA	NA	NA	NA	NA	<0.002	<0.002
methylene chloride	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
tetrachloroethene	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Semivolatile Organics										
bis(2-ethylhexyl)phthalate	mg/L	NA	NA	NA	NA	NA	NA	NA	<0.006	<0.006
di-n-octyl phthalate	mg/L	NA	NA	NA	NA	NA	NA	NA	<0.01	<0.01
Field and Natural Attenuation Parameters										
alkalinity	mg/L	<5	8.7	13.1	12.6	8.3	13.1	8.9	64.8	33.4
chloride	mg/L	1.5	1.2	5.2	5.1	2.3	13.9	2.6	1.9	5.9
dissolved oxygen	mg/L	9.28	2.98	0.25	0.25	2.08	5.85	6.18	1.91	5.5
ferrous Fe	mg/L	0.08	0.04	0.01	0.01	0.02	0	0.05	0.05	0.69
groundwater elevation	feet MSL	717.63	698.93	697.62	697.62	688.53	688.51	676.86	683.78	681.50
manganese (dissolved)	mg/L	0.0208	0.0675	0.116	0.117	0.0538	0.132	0.0067	0.048	0.0125
ORP	mV	280.1	269.8	303.5	303.5	238.1	152.5	170.1	109.5	130.1
pH	su	4.21	5.15	4.62	4.62	4.85	4.89	4.95	7.68	5.95
specific conductance	umhos/cm	0.031	0.029	0.046	0.046	0.047	0.117	0.072	0.252	0.172
temperature	degrees C	23.37	24.28	21.98	21.98	23.13	18.87	15.2	20.64	19.68
total organic carbon	mg/L	<1	<1	1.1	<1	<1	1.1	1.4	1.3	<1
turbidity	NTU	9.73	16.85	4.57	4.57	12.78	1.33	0.46	0	7.38

NA - Not Analyzed
degrees C - degress Celsius
feet MSL - feet above mean sea level
mg/L - milligrams per liter
mV - millivolts
NTU = nephelometric turbidity units
su - standard units
umhos/cm - micromhos/cm

Table 3
Summary of Baseline Performance Monitoring Results
April 2014
Auriga Spartanburg Facility
AECOM Project No. 60280417

Parameter	Unit	RW-119 4/1/2014	RW-121 4/2/2014	RW-123 4/3/2014	RW-123 Dup 4/3/2014	RW-127 4/3/2014	RW-129 4/2/2014	RW-133 4/2/2014	RW-137 3/31/2014	RW-139 3/31/2014
Volatile Organics and 1,4-Dioxane										
chloroform	mg/L	0.214	0.115	0.0235	0.0224	1.06	0.575	0.0492	0.243	0.958
cis-1,2-dichloroethene	mg/L	<0.005	<0.005	0.0079	0.0074	0.0086	<0.005	<0.005	<0.005	<0.005
1,4-dioxane	mg/L	0.0048	0.0034	NA	NA	NA	NA	NA	NA	NA
methylene chloride	mg/L	<0.005	<0.005	<0.005	<0.005	0.0189	0.0141	<0.005	<0.005	<0.005
tetrachloroethene	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Semivolatile Organics										
bis(2-ethylhexyl)phthalate	mg/L	<0.006	<0.006	NA	NA	NA	NA	NA	NA	NA
di-n-octyl phthalate	mg/L	<0.01	<0.01	NA	NA	NA	NA	NA	NA	NA
Field and Natural Attenuation Parameters										
alkalinity	mg/L	71.7	68.8	85.5	85.8	85.8	242	127	69.6	57.9
chloride	mg/L	3	2.6	2.8	2.7	11.6	13.2	4.9	6.3	4.3
dissolved oxygen	mg/L	8.2	1.95	0.47	0.47	1.17	0.2	2.58	0.84	0.46
ferrous Fe	mg/L	0.12	0	0	0	0	0.08	0.02	0.22	0.12
groundwater elevation	feet MSL	673.15	664.63	720.25	720.25	716.16	709.34	683.24	687.99	673.26
manganese (dissolved)	mg/L	0.0086	<0.005	0.0129	0.0128	0.0647	0.161	0.14	0.0549	0.0349
ORP	mV	127.5	116.4	44.5	44.5	137.2	3.5	158.9	119.8	131.6
pH	su	7.23	6.98	7.41	7.41	6.9	6.49	5.92	5.81	5.39
specific conductance	umhos/cm	0.269	0.232	0.161	0.161	0.369	0.433	0.211	0.217	0.195
temperature	degrees C	15.83	19.67	20.25	20.25	19.81	21.62	18.83	20.99	16.94
total organic carbon	mg/L	<1	2.7	<1	1.1	<1	1.2	1.1	1.9	1.3
turbidity	NTU	257.7	1.79	0.46	0.46	0.44	0.01	23.36	3.65	0.64

NA - Not Analyzed
degrees C - degress Celsius
feet MSL - feet above mean sea level
mg/L - milligrams per liter
mV - millivolts
NTU = nephelometric turbidity units
su - standard units
umhos/cm - micromhos/cm

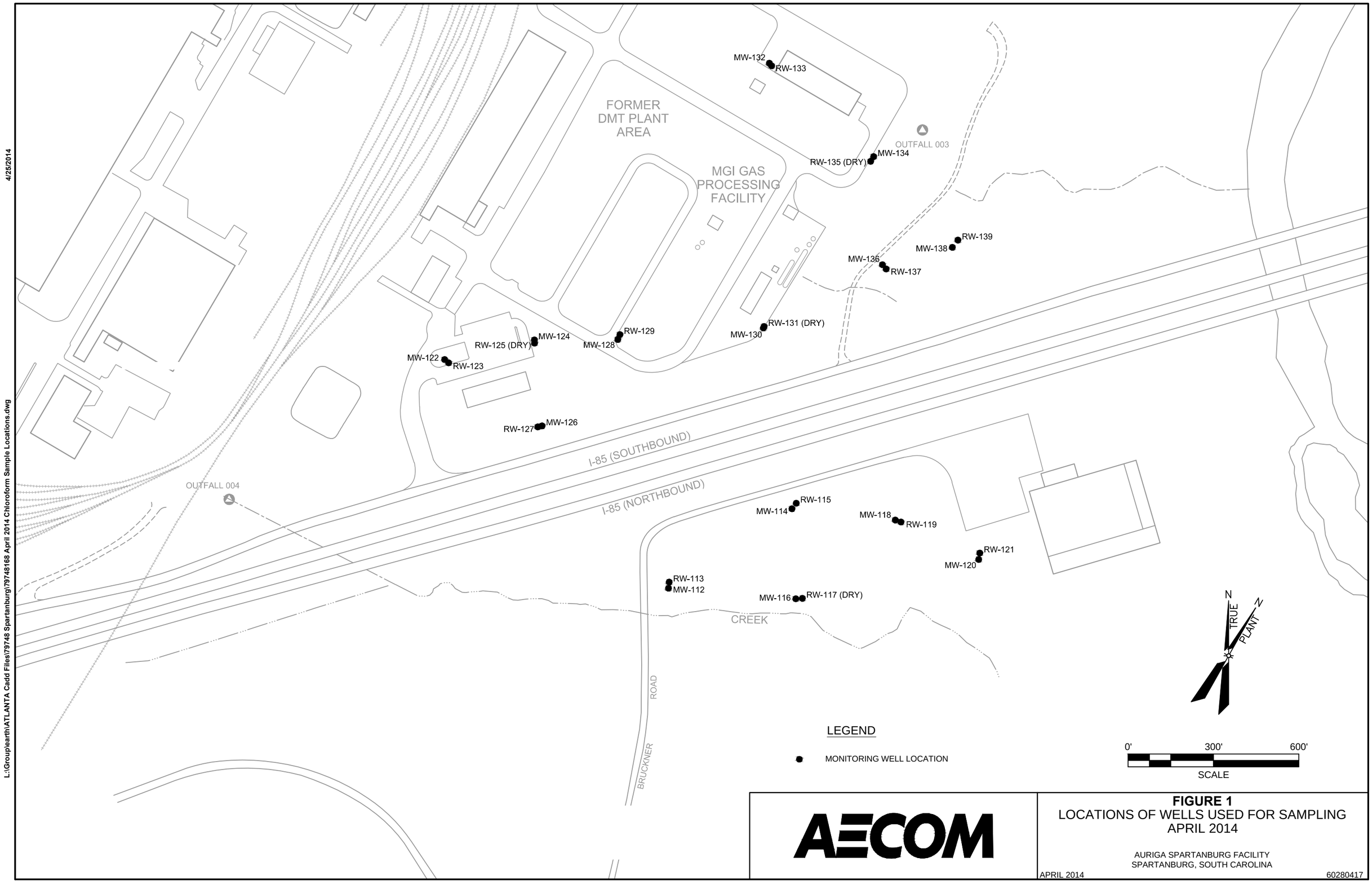


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FIGURE 1
LOCATIONS OF WELLS USED FOR SAMPLING
APRIL 2014

AURIGA SPARTANBURG FACILITY
SPARTANBURG, SOUTH CAROLINA

APRIL 2014 60280417

4/25/2014

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FORMER DMT PLANT AREA

MGI GAS PROCESSING FACILITY

OUTFALL 003

OUTFALL 004

I-85 (SOUTHBOUND)

I-85 (NORTHBOUND)

CREEK

BRUCKNER ROAD

MW-132
<0.005

MW-134
5.29

MW-136
<0.005

MW-138
0.148

MW-130
0.0398

MW-124
0.798

MW-128
0.0077

MW-122
0.0308

MW-126
2.0

MW-114
1.66

MW-118
0.697

MW-120
0.149

MW-112
2.0

MW-116
0.845

N
TRUE
PLANT

LEGEND

MONITORING WELL LOCATION

ALL RESULTS IN mg/L.

0' 300' 600'
SCALE

AECOM

FIGURE 2
BASELINE RESULTS FOR SAPROLITE WELLS
CHLOROFORM

AURIGA SPARTANBURG FACILITY
SPARTANBURG, SOUTH CAROLINA

APRIL 2014 60280417

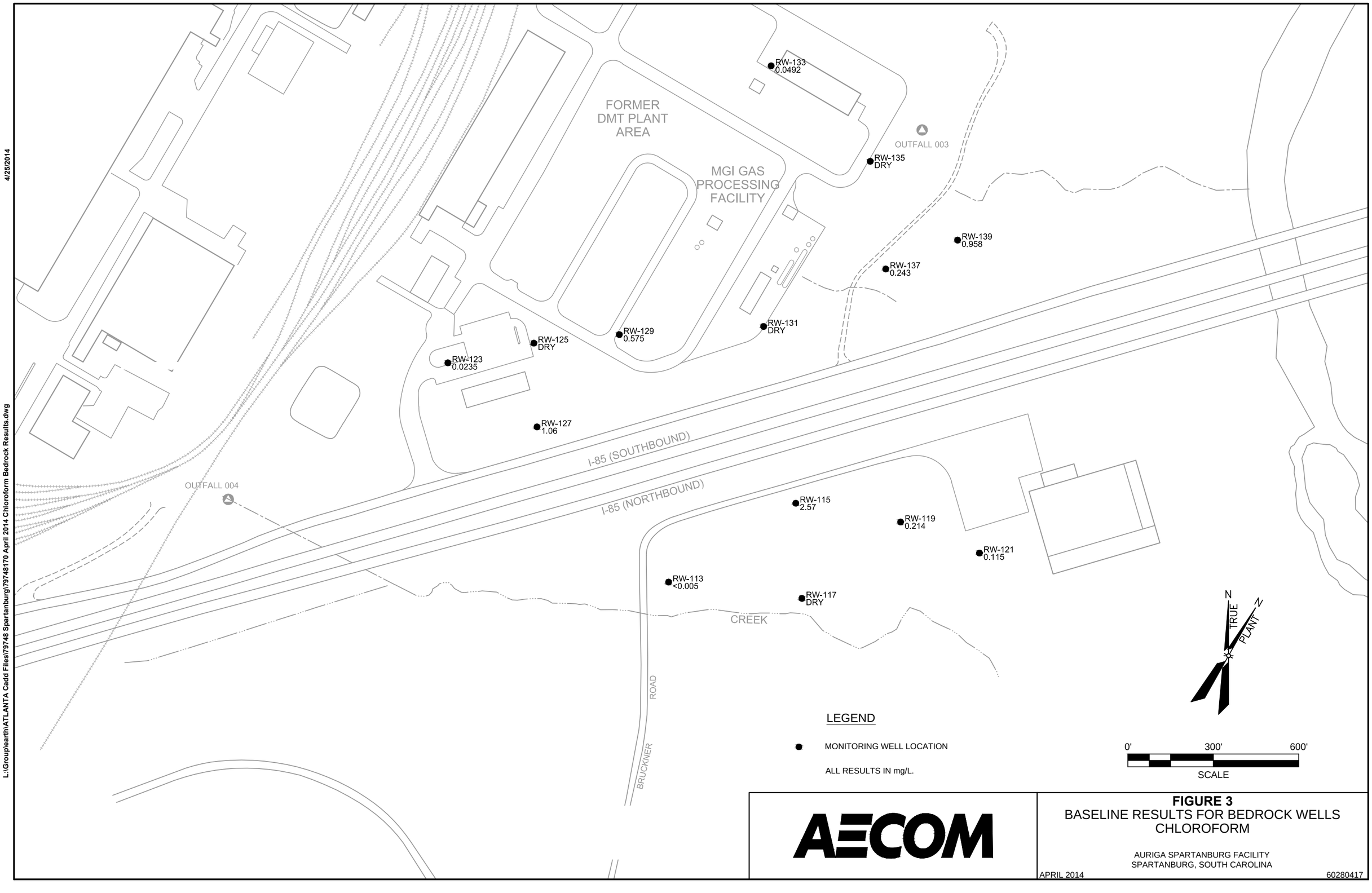

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FIGURE 3
BASELINE RESULTS FOR BEDROCK WELLS
CHLOROFORM

AURIGA SPARTANBURG FACILITY
SPARTANBURG, SOUTH CAROLINA

APRIL 2014 60280417

4/25/2014

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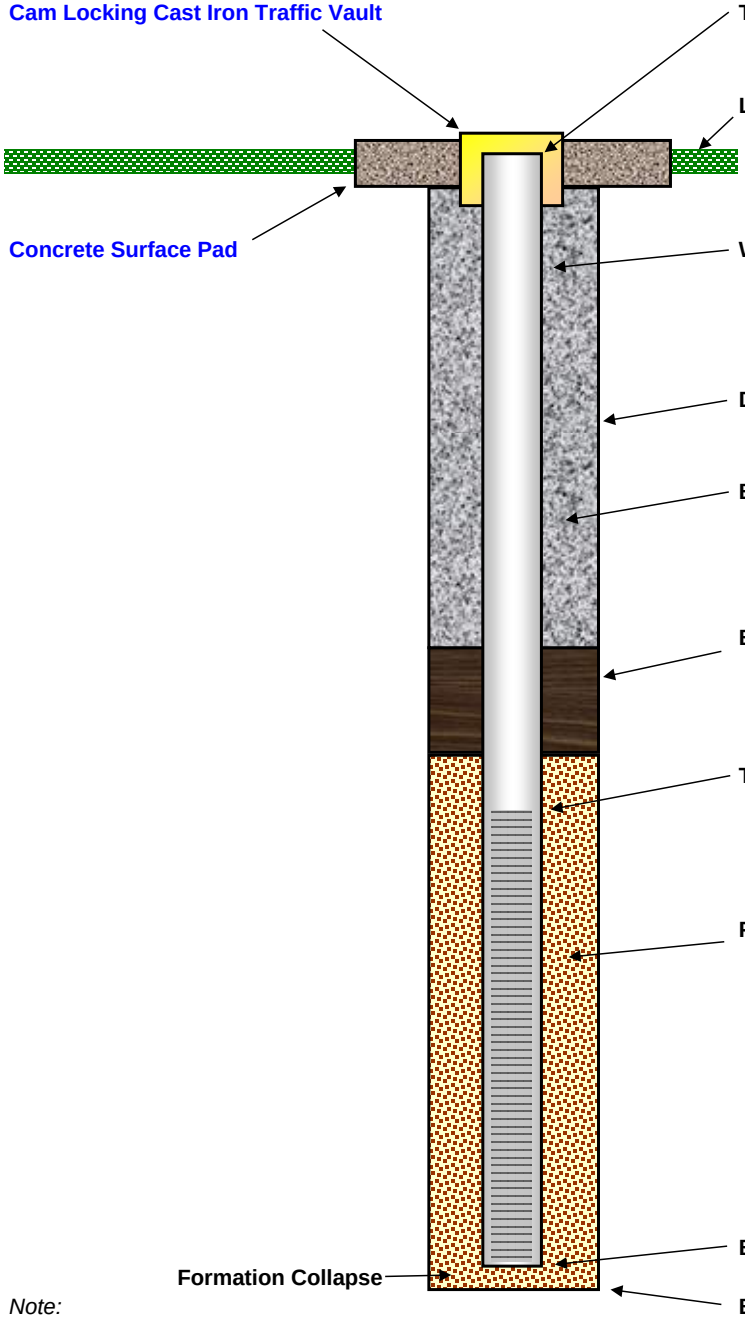
GROUNDWATER MONITORING WELL INSTALLATION DETAIL

Project Name: Auriga Spartanburg **Drilling Co:** AE Drilling Services **Well Number:** MW-112

Location: **Driller:** Bergman **Job Number:** 60135440

Client: Celanese **Drilling Method:** Hollow Stem Auger **Date Completed:** 12/5/2013

Geologist: Mark Hartford **Static Water Level** _____ **b.TOC** **Survey Datum:** _____



Top Of Casing Elevation **699.73** ft **-0.24** ft Stickup

Land Surface Elevation **699.97** ft

Well Casing From **0.00** ft to **28.7** ft

Casing Type: SCH-40 PVC
Inside Diameter: **2 in.**

Diameter of Borehole (nominal)
8.0 in

Bentonite/Cement Grout
From **0.0** ft to **23.5** ft

Bentonite Seal
Type: **Holeplug**
From **23.5** ft to **26.5** ft

Top of Screen Depth **28.7** ft
Screen Type: SCH-40 PVC
Screen Slot Size: **0.010 in** ID **2.0** in
Screen Length: **10.0** ft
Bottom Plug **0.3** ft

Filter Sand for Screen
Sand Type: **Medium**

Filter sand From **26.5** ft to **39.0** ft

Bottom Well/Screen + 0.3 Plug Depth **39.0** ft

Bottom of Boring Depth **40.5** ft

Total Depth of Well, b. Top of Casing Depth _____ ft

Note:
Drawing Not to Scale
All Depths are Referenced to Ground Surface

AECOM

ABANDONED

GROUNDWATER MONITORING WELL INSTALLATION DETAIL

Project Name: Auriga Spartanburg | **Drilling Co:** AE Drilling Services | **Well Number:** RW-113

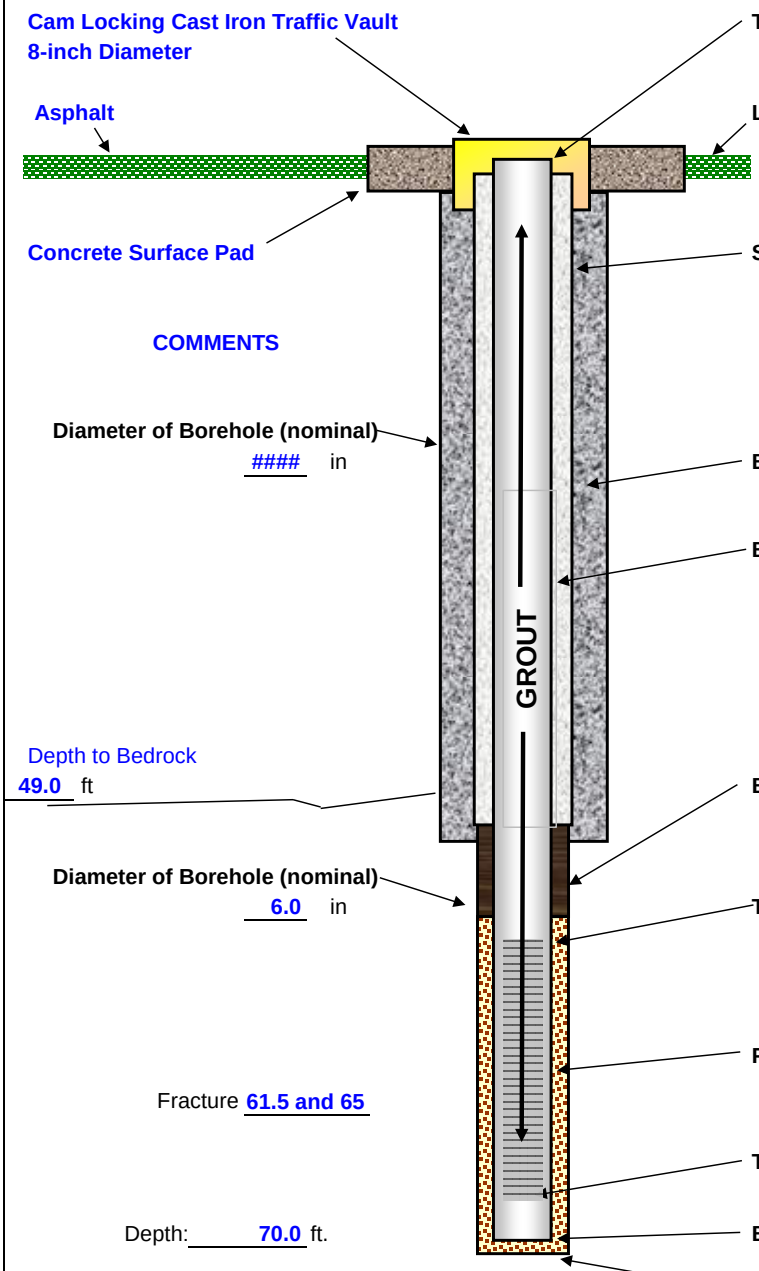
Location: | **Driller:** Dan Bergman | **Job Number:** 60280417

Surface Casing: 3/20/2014

Client: Celanese | **Drilling Method:** Mud/Air Rotary | **Date Completed:** 3/26/2014

Rock Drilling:

Geologist: Mark Hartford | **Static Water Level:** b.TOC | **Survey Datum:** NGVD '88



Cam Locking Cast Iron Traffic Vault
8-inch Diameter

Asphalt

Concrete Surface Pad

COMMENTS

Diameter of Borehole (nominal)
in

Depth to Bedrock
49.0 ft

Diameter of Borehole (nominal)
6.0 in

Fracture **61.5 and 65**

Depth: **70.0** ft.

Top Of Casing Elevation **702.44** ft **-0.28** ft Stickup

Land Surface Elevation **702.72** ft

Surface Casing From **0.0** ft to **55.0** ft

Casing Type: **Carbon Steel**
Inside Diameter: **6-in.**

Bentonite/Cement Grout
From **0.0** ft to **55.0** ft

Bentonite/Cement Grout
From **0.0** ft to **52.6** ft

Bentonite Seal
Type: Hole Plug
From **52.6** ft to **57.6** ft

Top of Screen
Screen Type: SCH 40 PVC Depth **59.7** ft
Screen Slot Size: 0.010 in
Screen Length: **10.0** ft ID **2.0** in
Bottom Plug: **0.3** ft

Filter Sand for Screen
Sand Type: medium
From **57.6** ft to **70.0** ft

Top of Sediment Sump/Bottom Screen Depth **69.7** ft
Type: 2-inch PVC

Bottom of Well Depth **70.0** ft

Bottom of Boring Depth **70.0** ft

Note:
Drawing Not to Scale
All Depths are Referenced to Ground