JTM ASSOCIATES, LLC
environmental consulting

December 2, 2013

John R. Strang, P.E.
NYSDEC
Region Four Headquarters
1130 North Westcott Road
Schenectady, NY 12306-2014

Re: West Well – Plating Building Site
Acidic Wastewater Loss
Groundwater Impact Assessment

Dear Mr. Strang:

JTM Associates, LLC submitted a 15 Day Spill Report on behalf of Amphenol Corporation to NYSDEC on August 30, 2013. This document provided information regarding the suspected loss of acidic wastewater (NYSDEC Spill # 1305408) from the plating operations, in-floor, wastewater conveyance trench system at the facility in Sidney, NY. In your letter dated September 11, 2013commenting on the spill report, the Department expressed concerns the wastewater loss may be subject to uncontrolled migration in the environment. Furthermore, it was requested that Amphenol submit an evaluation of the containment provided by the ongoing shallow groundwater recovery, which is an element of the interim groundwater remediation program required by the Administrative Order on Consent (AOC) for the West Well – Plating Building Site (DEC Site #413010). This letter report responds to your request.

Site background

The West Well – Plating Building site was first investigated in 1984 at the request of NYSDEC and in response to the detection of volatile organic compounds (VOCs) in the industrial supply well (referred to as the West Well) at the Amphenol, Sidney, NY facility. The initial studies together with follow-up hydrogeologic evaluations are summarized in "Final Report – Hydrogeologic and Soils Investigation at the West Well and West Parking Lot", Environmental Resources Management, Inc. (ERM), April 1986. This document continues to serve as the primary reference regarding the hydrogeology and groundwater hydraulics in this area of the Amphenol facility.

In January 1989, Amphenol retained O'Brien & Gere Engineers (OBG) to assess the subsurface conditions and particularly the shallow groundwater chemistry around and beneath the plating building. This was in response to the discovery of several failures of the plating operations, in-floor, wastewater conveyance trench system. This investigation included the installation of several groundwater monitoring wells near and inside of the plating building.

Figure 1 illustrates the West Well - Plating Building site area together with the location of groundwater wells monitored following the recent wastewater loss and considered as part of this impact assessment. The wells with a WP and WW prefix are those installed during the 1986 ERM

investigation. Wells installed as part of the 1989 OBG study have a MW prefix. All monitoring wells, except those located within and immediately outside the plating building, are constructed of 2-inch ID PVC pipe and slotted well screen in boreholes advanced with conventional hollow-stem auger drill methods. Due to access limitations, wells MW-5 through MW-14, are constructed of 1.25-inch ID PVC well casing and slotted screen, installed in boreholes advance by driving 3-inch ID casing with a roller-bit assembly to removed cuttings. All wells include a sand-pack in the screened interval, a bentonite seal and cement grout to the surface.

In November 1988, Amphenol Corporation and the NYSDEC executed an AOC concerning the conditions of the site and selected interim remedial measures. In the order, Amphenol agreed to continue to pump the West Well to remediate and contain groundwater VOC contamination in this area of the facility.

In addition to pumping the West Well, groundwater is extracted from two of the 1.25-inch, shallow groundwater monitoring wells (MW-7 and MW-11on Figure 1). This operation began in August 1989 per a verbal agreement between Amphenol and NYSDEC and in response to the OBG investigations earlier that year. Amphenol also continues to monitoring and groundwater elevations and groundwater chemistry in the West Well and plating building area on a calendar quarterly frequency.

Site hydrogeology

Figure 2 illustrates a hydrogeologic cross-section, adapted from the ERM report, for the West Well and plating building area. In general, the geologic column in the West Well area is composed of unconsolidated deposits of glacial morphology overlying Devonian age sedimentary bedrock and is characterized as follows:

- 4 to 6 feet of man-placed fill including sand, gravel, cobbles and some construction rubble
- 20 to 25 feet of inter-bedded silts, sands and gravels
- 60 to 70 feet of well sorted fine sands with thin silt and clay horizons
- 10 to 15 feet of dense glacial till
- Sedimentary bedrock the first 30 feet of which is largely composed of inter-bedded shale and siltstones

The upper inter-bedded silt, sand and gravel unit, the horizon where the on-going shallow groundwater recovery takes place from, supports a water table that occurs approximately 10 feet below the surface. The difference in groundwater elevation between various monitoring wells in this saturated zone is relatively small as documented in quarterly monitoring reports submitted over more than a decade of monitoring. This results in a very nominal influencing hydraulic gradient (0.005 ft/ft or less) and makes interpretation of local flow patterns beneath and around the plating building difficult. Historic interpretations and recent data indicate that shallow groundwater flow in the vicinity of the plating building varies from north-northwest to north-northeast toward the Susquehanna River consistent with the regional shallow water table aquifer. However, given the flow direction is largely controlled by topography and surface drainage features, west of the plating building a more westerly component flow is often observed due to the

influence of a small creek (Tributary 147) which runs south to north along the west side of the Amphenol property .

The fine sand and silt unit contains groundwater under semi-confined conditions. Groundwater levels in this unit are significantly influenced by the pumping of the West Well supply well. When the West Well is pumping, a noteworthy cone of depression develops in this deeper unconsolidated unit.

The inter-bedded shale and siltstone horizons making up the bedrock unit contain an aquifer which is confined by the lower glacial till. The West Well is constructed in the bedrock as an open- hole well. The 1986 ERM report presents aquifer performance data from the supply that indicate noteworthy drawdown is observed in the monitoring wells situated in the silty-sand, deep overburden unit. They opine that the grouting of the West Well casing may be incomplete and hydraulic connection occurs in the annular space between the casing and borehole wall which facilitates the supply well's hydraulic influence on the deep overburden. ERM also concludes that, based on the aquifer performance tests, the hydraulic communication between the shallow and deep overburden is poor. The aquifer performance test also suggests that the pumping of the West Well has a nominal, if any, influence on the shallow water table.

On-going groundwater remediation

The on-going groundwater remediation includes the pumping of the West Well bedrock well and extraction from shallow monitoring wells MW-7 and MW-11. Use of the West Well for groundwater remediation is mandated by the AOC. Discharge from this industrial supply well is directed to a packed column air-stripper prior to distribution to plant manufacturing processes and other non-potable uses. The extraction of groundwater from MW-7 and MW-11 began in August 1989 as a result of a verbal agreement between the then Amphenol, Environmental Manager, Henry Mitchell and the NYSDEC representative at the time, Walt Wintsch.

To address NYSDEC's recent comments regarding the shallow groundwater recovery and the potential impact of the acidic wastewater loss on the environment, the following efforts were completed:

- Review of the available hydrogeologic studies cited earlier
- Completion of in-situ hydraulic conductivity tests at select shallow monitoring wells
- Estimation of the shallow water table flow beneath the plating building area
- Inspection of the MW-7 and MW-11 general conditions and operation, pumping equipment and flow recording instrumentation
- Review of weekly and monthly pH monitoring data collected since the discovery of the loss

Previous hydrogeologic evaluations indicate that the shallow groundwater flow direction is generally to the north toward the Susquehanna but varies from north-northwest to north-northeast. The influencing hydraulic gradient is very shallow and typically between 0.002 and 0.005.

To quantify basic groundwater flow dynamics of the shallow zone, in-situ hydraulic conductivity tests (k-tests) were completed on four of the shallow, 2-inch monitoring wells; WP-1, WW-2, WW-3 and WW-4. K-test data and calculations are included in the attached exhibits. The results of these tests indicated an average hydraulic conductivity of 1.8×10^{-2} cm/sec or approximately 380 gallons/day/ft^2. This is generally consistent with the sand and gravel composition of the shallow water table.

The hydrogeologic cross-section illustrated in Figure 2 indicates that the shallow water table is approximately 20 feet thick beneath the plating building. The quantity of groundwater flowing under the plating area can be estimated using Darcy's Law:

$$Q = K\ I\ A$$

Where Q = gallons per day
K = hydraulic conductivity = 380 gpd / ft^2
I = hydraulic gradient = 0.005
A = cross-sectional area perpendicular to the flow path = 20 ft x 250 ft (width of the plating area depicted on Figure 1 from MW-2 to east of the wastewater treatment system tanks) = 5000 ft^2

Then Q = 9,500 gallons per day

The construction logs for MW-7 and MW-11 are included in the attached exhibits. As noted earlier they are constructed of 1.25-inch ID PVC well casing and slotted screen, installed in boreholes advance by driving 3-inch ID casing with a roller-bit assembly to removed cuttings. Following the verbal agreement to use these monitoring wells for the extraction of groundwater, they were each equipped with a ½ inch, ridged PVC suction line inserted in the well and attached to an air actuated diaphragm pump. A convention, paddle-wheel flow meter/totalizer monitors flow rate prior to discharge to the acidic wastewater conveyance trench. Pumping is not controlled relative to the groundwater level of the respective extraction well.

Flow rates from MW-7 and MW-11 have been periodically, physically measured during this evaluation to assess the accuracy of the existing flow meters. These measurements indicate the MW-7 extracts between 0.1 and 0.5 GPM and MW-11 recovers between 0.5 and 1 GPM. These values are between a factor of 10 and 20 lower than the values reported by the flow meters during the period of physical, flow measurements. Using a total extraction rate of 1.5 GPM, MW-7 and MW-11 combined collect approximately 23% of the estimated daily flow beneath the plating building.

When MW-7 and MW-11 were installed it was not contemplated that they would be integrated into a groundwater remedial effort. Inspection and review of their use and operation for the purposes of groundwater extraction reveals the following.

1. The well constructions do not promote efficient groundwater recovery because of their small diameter and the screen and gravel pack not being designed to suit the specific aquifer formation.

2. Their partial penetration, screening less than 50% of the water table aquifer thickness, limits available drawdown at the extraction point.

Acidic wastewater loss impact on groundwater pH

Upon noticing the suppressed pH at MW-11 and reporting of the spill to NYSDEC, the pH of the discharge of MW-7 and MW-11 has been monitored weekly. Additionally, the pH of all wells proximate to and inside of the plating building has been monitored monthly. Table 1 summarizes the weekly recordings; weekly pH values are also depicted on the provided data plot. Table 2 provides the monthly data.

Following the incident, NYSDEC directed Amphenol to complete inspection and integrity testing of the wastewater conveyance system. The results of these efforts are summarized in the Barton & Loguidice, PC report transmitted to the Department on November 25, 2013. During hydrostatic testing, which occurred on October 19 and 20, 2013, two suspect areas along the north, acidic conveyance trench were identified. Following this discovery, the north trench was taken out of service by diverting process flows. The manufacturing line was then disassembled so a detailed visual inspection of the conveyance could be accomplished.

The visual inspection confirmed two locations where the conveyance system was compromised. These areas were repaired on Saturday, November 2, 2013 by installing 8 layers of fiberglass and resin in the suspect areas and 5 layers of fiberglass and resin along the entire length of the trench section where the hydro-static testing indicated a possible low volume loss. Wastewater discharges to the repaired conveyance were re-started November 6, 2013.

Weekly data indicate that suppressed pH values (1.2 to 3 s.u.) were observed at MW-11 following the loss and continuing until early November. However, following the shutdown of process discharges and the repairs to the north trench made in early November, noteworthy increases in pH have been observed. In fact beginning on November 8, 2013 and continuing to date, pH values have been near neutral.

The summary of monthly pH data for all monitoring wells nearest to the plating building (Table 2) inform an interpretation of the horizontal and vertical extent of the impacts from the acidic wastewater loss. Review of these data indicates the effects of the loss are limited to MW-11. The limited areal extent of pH suppression cannot be quantifiably attributed to the groundwater extraction at MW-11. However, the removal of at least a portion of groundwater with low pH together with the natural buffering provided by the local subsurface material has, to date, contained the extent impacts to the plating building area and the Amphenol property.

Summary

Suppressed pH values have been observed in groundwater samples from well MW-11 which is located inside the plating operations building at the Amphenol Aero-Space facility in Sidney, NY. Inspection and integrity testing indicates that losses from the adjacent process wastewater conveyance is the source of the pH suppressing agent.

Groundwater monitoring wells MW-7 and MW-11 are installed in the local shallow water table aquifer. Since August 1989, both wells have been used to extract groundwater per a verbal agreement between Amphenol and NYSDEC.

Existing hydrogeologic data and extraction operating data are insufficient to assess the groundwater capture effectiveness of wells MW-7 and MW-11. An estimation of the local hydraulic budget indicates that the combined discharge from these wells only collects a portion of the groundwater flowing beneath the plating building area.

Detailed visual inspection of the north conveyance trench was completed subsequent to hydro-static testing revealing possible leaks. The trench was found to be distressed in two locations. Repairs were made to the compromised areas following production shut-down.

Weekly and monthly groundwater pH monitoring continues at MW-7 and MW-11 and wells within and near the plating building. Weekly data from MW-11 indicate that pH values returned to near neutral following the repairs to the north trench. pH measurements from both shallow and deep monitoring wells indicates that the pH suppression effects of the wastewater losses is presently limited to the plating building area and contained on the Amphenol property.

Should questions arise regarding any of the enclosed materials, please do not hesitate to contact us.

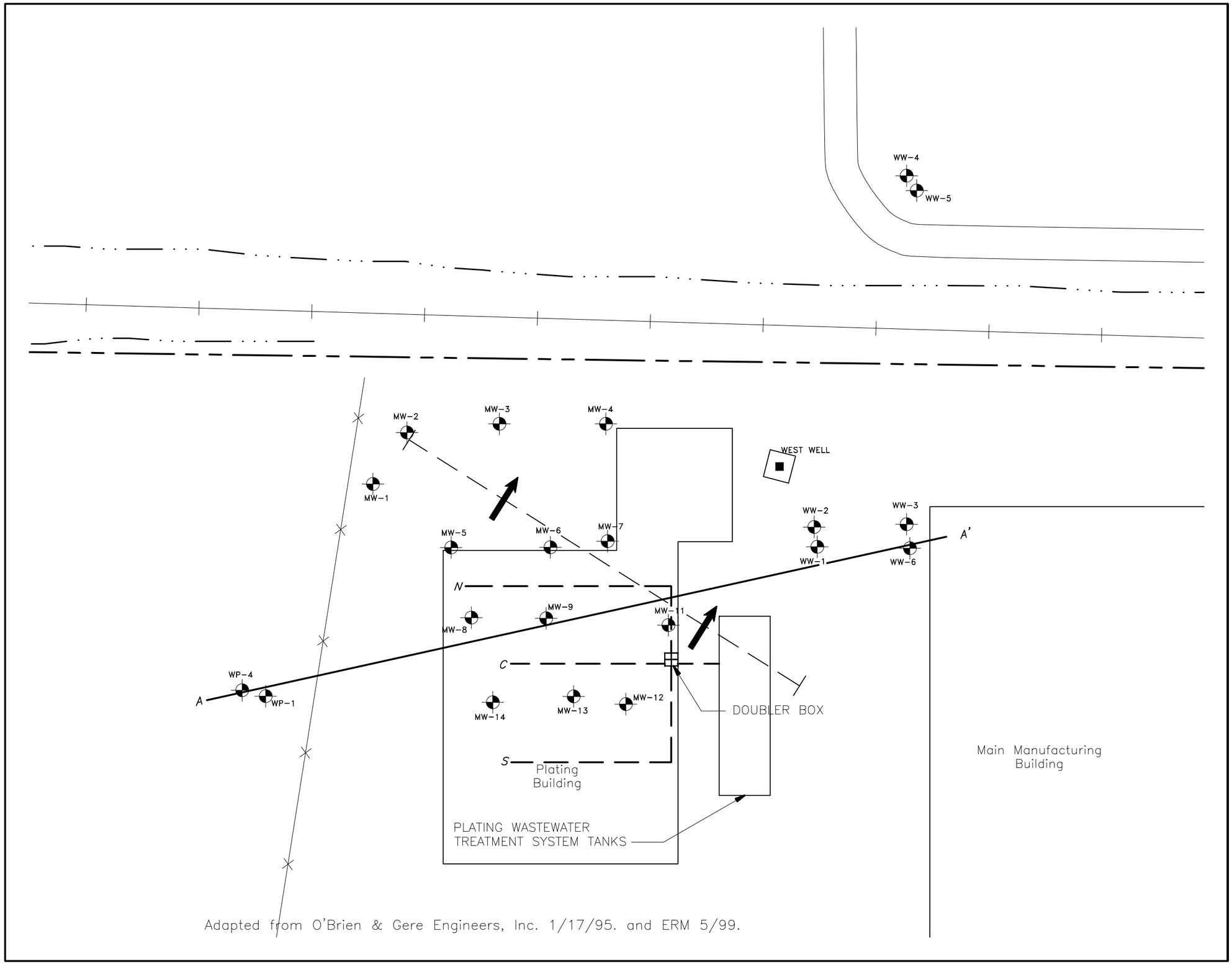
Very truly yours,
JTM ASSOCIATES, LLC

James T. Mickam, PG
President

cc: J. Bianchi – Amphenol
C. Doroski – NYSDOH

FIGURE 1

AMPHENOL CORPORATION
WEST WELL SITE
SIDNEY, NEW YORK



Adapted from O'Brien & Gere Engineers, Inc. 1/17/95. and ERM 5/99.

LEGEND

- PROPERTY LINE
- DRAINAGE DITCH
- RAILROAD
- SUPPLY WELL LOCATION
- MONITORING WELL LOCATION
- DOUBLER BOX
- WASTEWATER CONVEYANCE TRENCH
- A — A' LINE OF CROSS SECTION
- SHALLOW GROUND WATER FLOW PATH

50 0 50

FILE NO. 001.001-119

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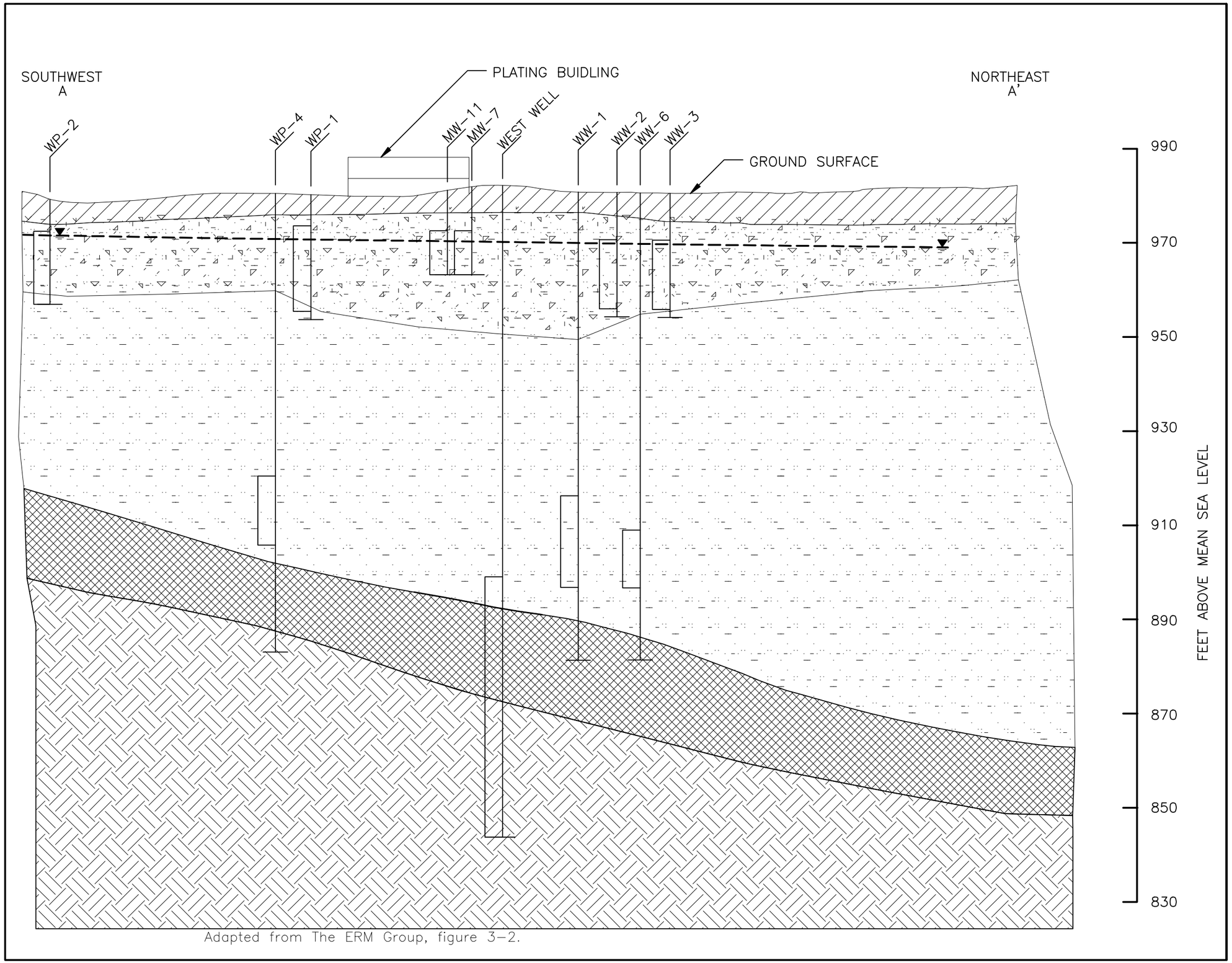
DWG PATH: C:\DWGS\JTM-ASSOCIATES\AMPHENOL\WEST_WELL_SITE\1QTR98\119.DWG SF 11

PLOT DATE: 11/27/13

FIGURE 2

AMPHENOL CORPORATION
WEST WELL SITE
SIDNEY, NEW YORK



Adapted from The ERM Group, figure 3-2.

HYDROGEOLOGIC CROSS SECTION A – A'

LEGEND

WW-3
WELL IDENTIFICATION

SCREENED INTERVAL

SHALLOW WATER TABLE

DISTURBED ZONE

SILTS, SANDS AND GRAVELS

FINE SANDS, SILTS AND CLAYS

GLACIAL TILL

BEDROCK

100 0 100
HORIZONTAL SCALE

FILE NO. 001.001-120

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Table 1

Weekly Groundwater pH at Shallow Recovery Wells
West Well / Plating Building Site
Amphenol Aero-space
Sidney, New York

Date	MW-7	MW-11
08/16/13	7.60	1.20
08/23/13	8.00	3.50
08/30/13	7.38	2.53
09/06/13	7.76	2.37
09/13/13	7.80	3.00
9/20/2013	7.96	1.66
9/27/2013	8.12	2.22
10/4/2013	8.13	1.86
10/11/2013	8.18	4.04
10/18/2013	8.12	2.70
10/25/2013	8.06	2.13
11/1/2013	8.02	5.57
11/8/2013	8.11	6.90
11/15/2013	8.17	5.70
11/22/2013	8.04	6.42
11/29/2013	8.07	6.54

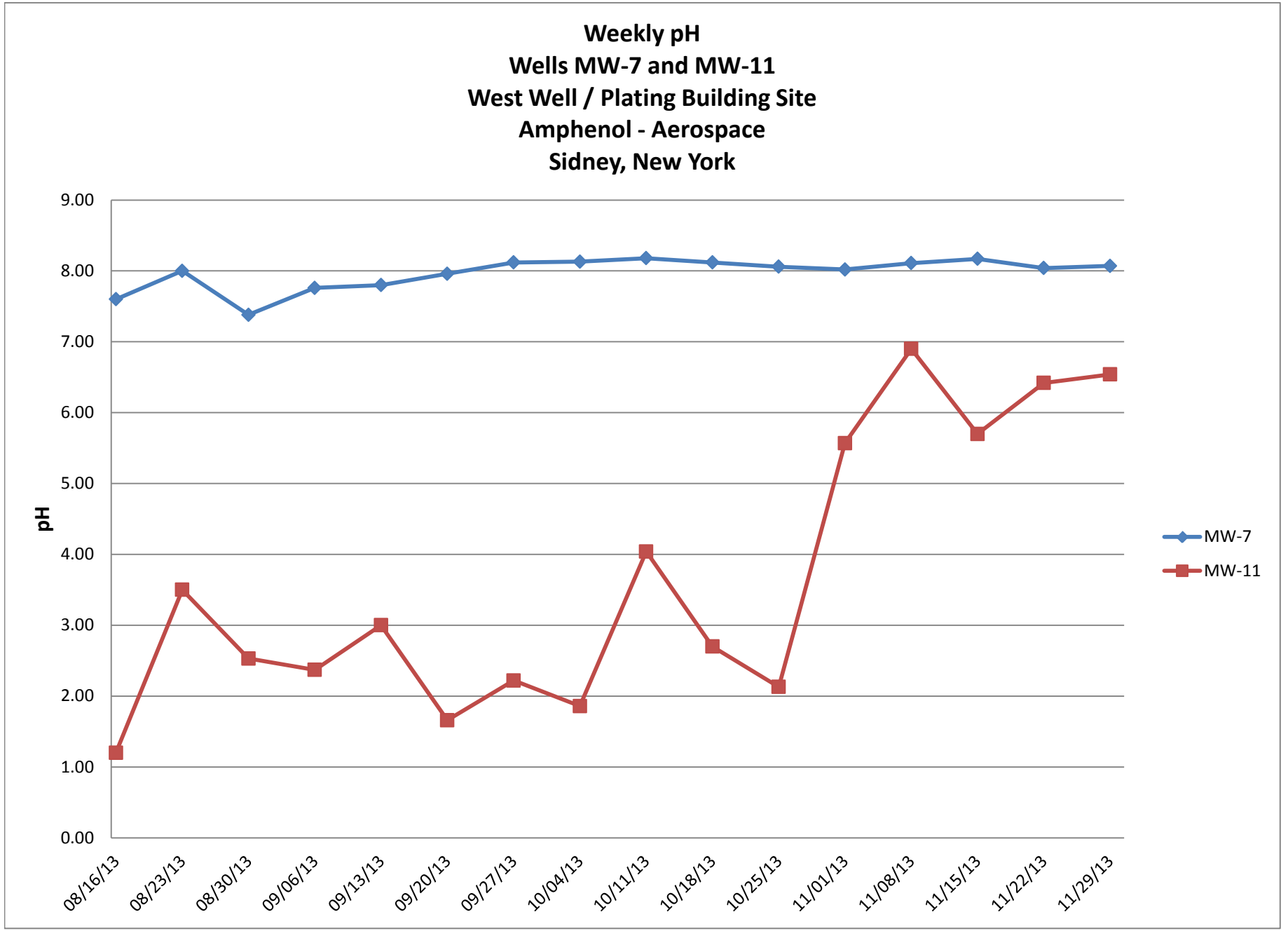

Weekly pH
Wells MW-7 and MW-11
West Well / Plating Building Site
Amphenol - Aerospace
Sidney, New York
pH
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
08/16/13
08/23/13
08/30/13
09/06/13
09/13/13
09/20/13
09/27/13
10/04/13
10/11/13
10/18/13
10/25/13
11/01/13
11/08/13
11/15/13
11/22/13
11/29/13
MW-7
MW-11

Table 2

Amphenol Corporation

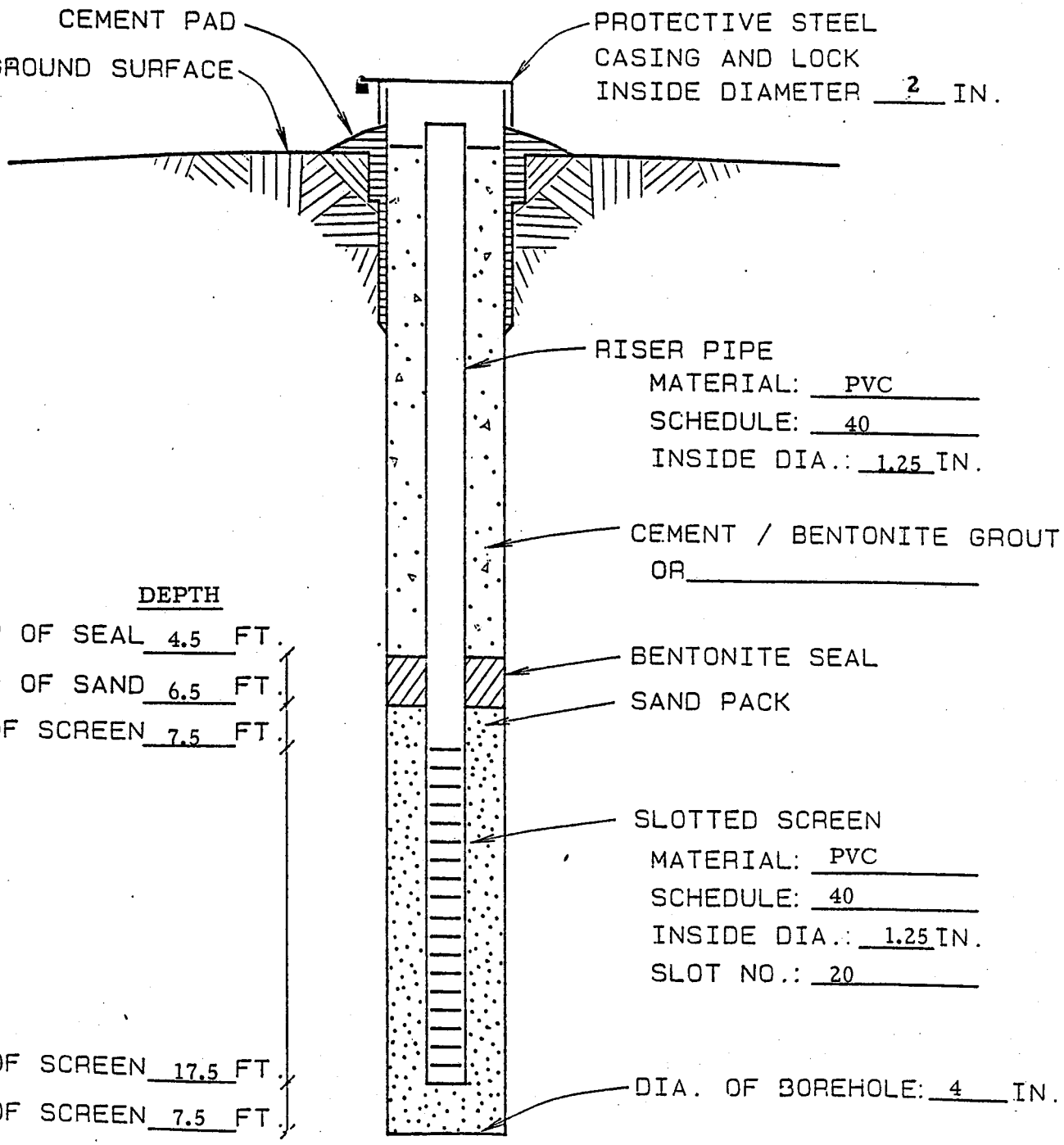
West Well and Plating Building Area

Monthly Ground Water pH Summary

Well ID	pH S.U.			
	8/16/2013	9/13/2013	10/18/2013	11/15/2013
West Well Monitoring Wells				
WW-2	7.4	6.6	6.6	6.6
WW-3	6.7	6.6	6.6	6.4
WW-4	6.2	6.4	7.8	7.3
WP-1	6.4	6.3	6.7	6.4
WP-2				
WP-3				
Plating Building Wells				
MW-1	6.3	6.6	6.5	6.6
MW-2	6.3	6.5	6.6	6.6
MW-3	6.4	6.5	6.6	6.6
MW-4	6.1	6.7	6.6	6.7
MW-5	6.9	7.0	6.9	8.0
MW-6	6.9	7.2	6.7	8.9
MW-7	7.2	7.1	6.8	6.5
MW-8	5.2	5.5	5.3	5.3
MW-9	6.4	6.2	6.3	6.4
MW-11	1.2	3.0	2.7	5.7
MW-12	6.4	6.6	6.7	6.5
MW-13	6.5	6.6	6.6	6.5
MW-14	6.3	6.4	6.3	6.5
Deep Overburden Wells				
WW-1	7.6	6.4	6.5	7.4
WW-5	7.6	7.6	6.4	7.6
WW-6	7.4	7.9	8.4	7.8
WP-4	6.5	6.4	7.0	6.4

EXHIBITS

MW-7

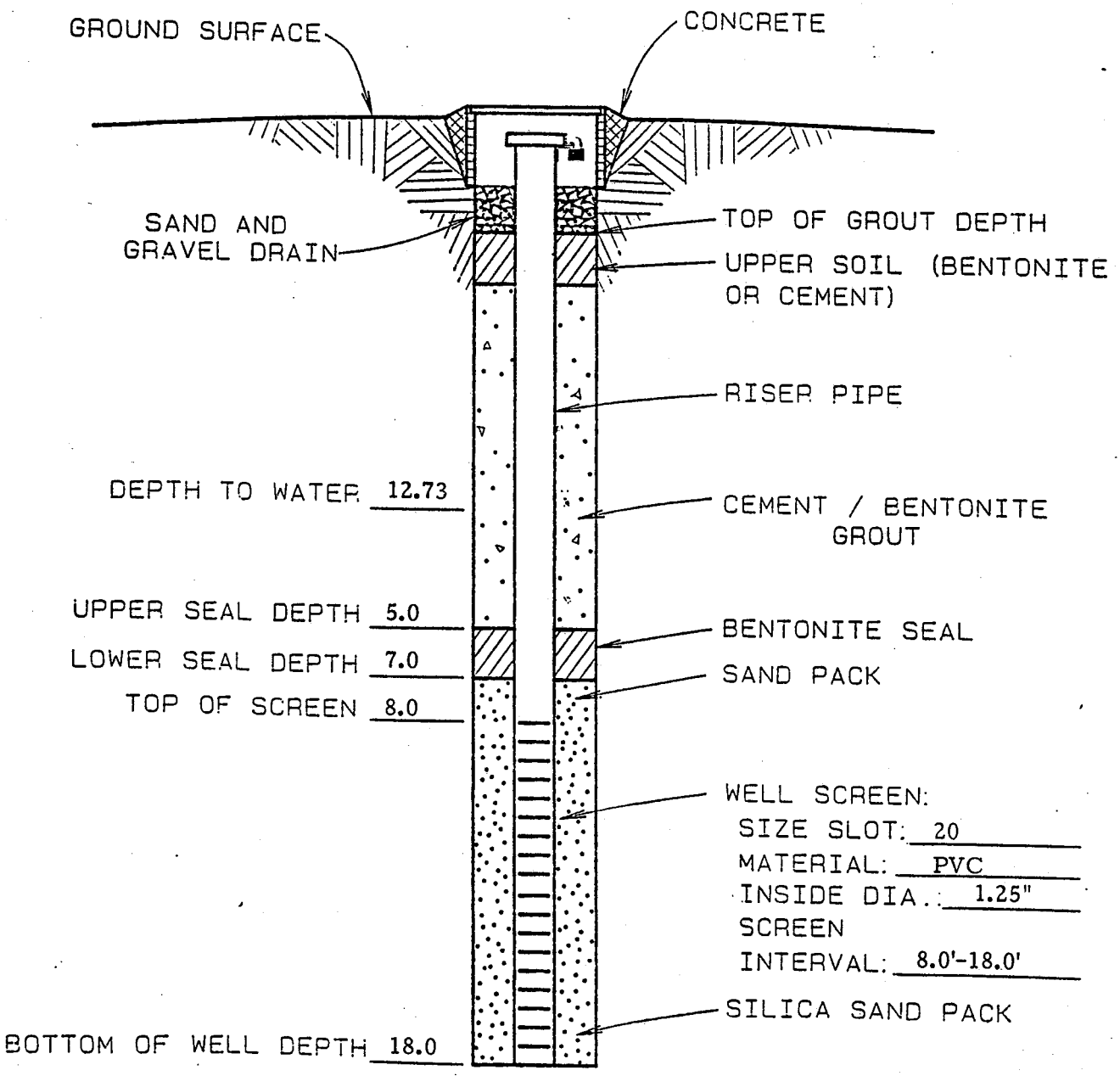


N.T.S.

WELL001G R42 L1

O'BRIEN & GERE

MW-11



NOT TO SCALE

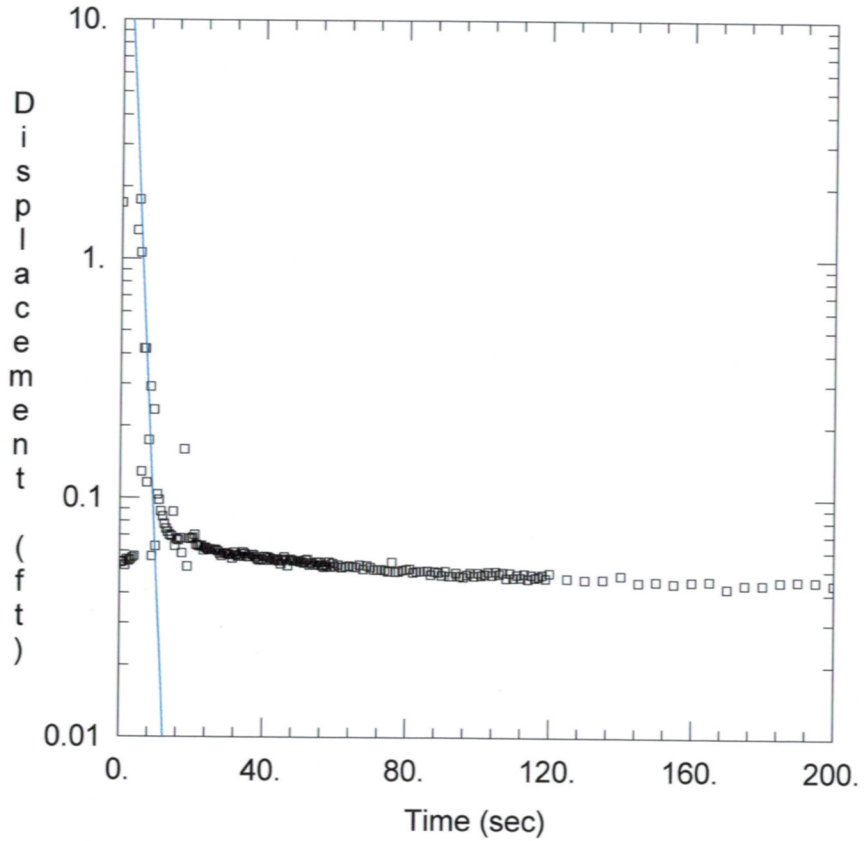
HELL0136 R42 L1

OBRIEN & GERE

TABLE 1.
Amphenol Boiler Room
Plating Room Project
HYDRAULIC CONDUCTIVITY TEST RESULTS

Friday, October 18, 2013

Well	Depth to Bottom (feet below mp)	Depth to Water (ft below mp)	Falling Head (cm/s)	Rising Head (cm/s)	Geometric Mean (cm/s)
WP-1	18.20	6.66	1.8E-02		1.8E-02
WW-2	17.90	8.20	1.9E-02	1.3E-02	1.6E-02
WW-3	21.76	7.46	2.1E-02	2.4E-02	2.3E-02
WW-4	24.28	13.18	1.1E-02	2.0E-02	1.5E-02
				Geometric mean	1.76E-02



WELL TEST ANALYSIS

Data Set: C:\...\WP-1 in.aqt
Date: 10/29/13 Time: 05:56:25

PROJECT INFORMATION

Company: Gould Groundwater
Client: Amphenol
Project: 1087
Location: Plating
Test Well: WP-1
Test Date: 10/18/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.01782 cm/sec
y0 = 73.82 ft

AQUIFER DATA

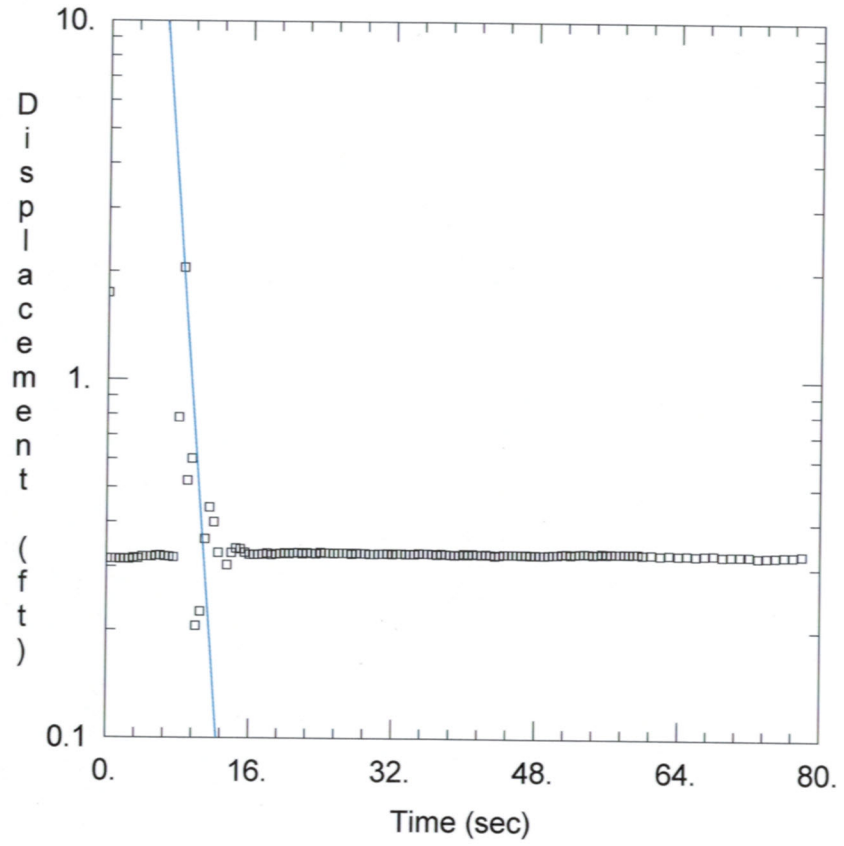
Saturated Thickness: 50. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WP-01)

Initial Displacement: 1.711 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.083 ft

Static Water Column Height: 11.54 ft
Screen Length: 15. ft
Well Radius: 0.083 ft



WELL TEST ANALYSIS

Data Set: C:\...\WW-2 slug.aqt
Date: 10/29/13 Time: 06:12:55

PROJECT INFORMATION

Company: Gould Groundwater
Client: Amphenol
Project: 1087
Location: Plating
Test Well: WW-2
Test Date: 10/18/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0191 cm/sec
y0 = 1279. ft

AQUIFER DATA

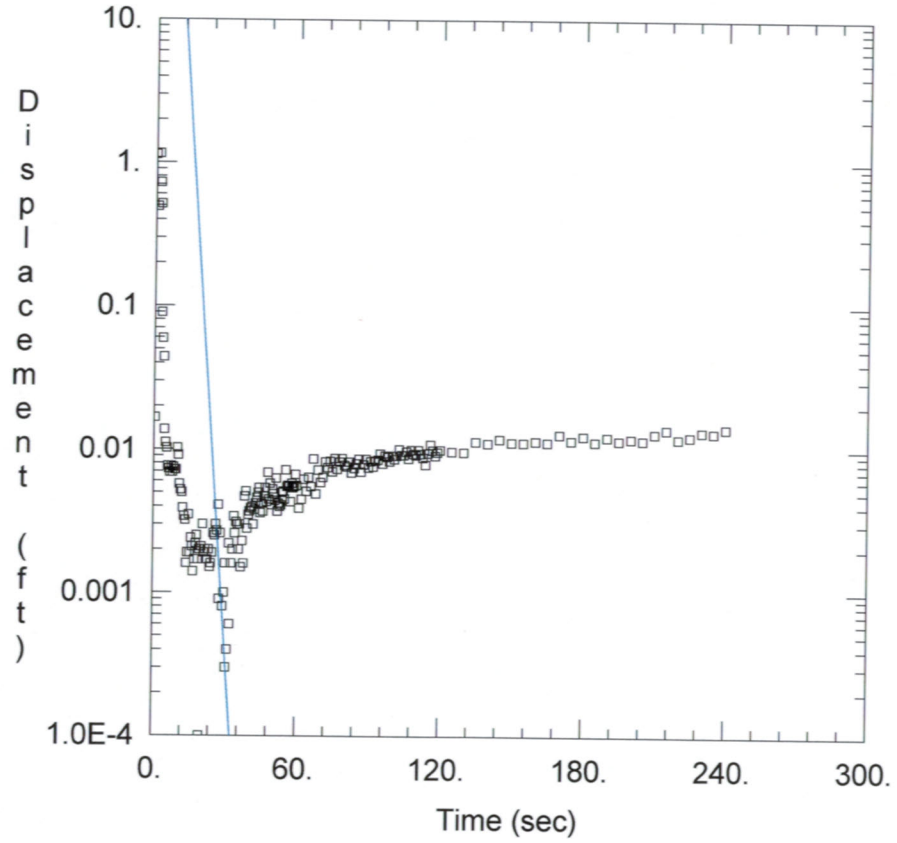
Saturated Thickness: 50. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WW-2)

Initial Displacement: 1.74 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.083 ft

Static Water Column Height: 9.7 ft
Screen Length: 15. ft
Well Radius: 0.083 ft



WELL TEST ANALYSIS

Data Set: C:\...\WW-2 bail.aqt
Date: 10/29/13 Time: 06:17:27

PROJECT INFORMATION

Company: Gould Groundwater
Client: Amphenol
Project: 1087
Location: Plating
Test Well: WW-2
Test Date: 10/18/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.01344 cm/sec
y0 = 5243. ft

AQUIFER DATA

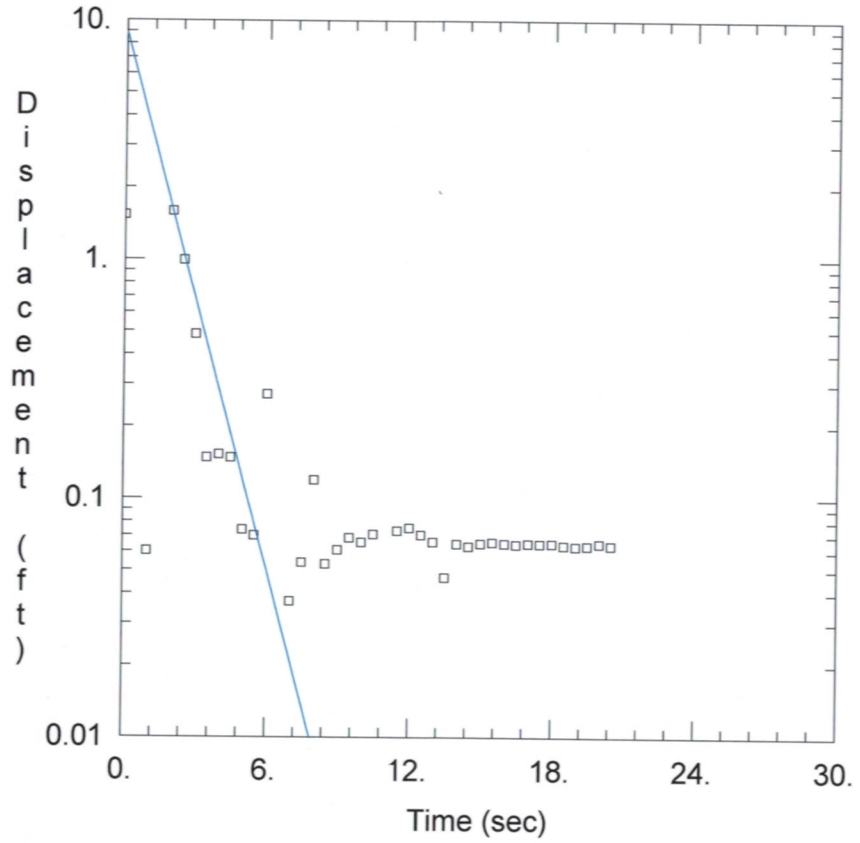
Saturated Thickness: 50. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WW-2)

Initial Displacement: 1.136 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.083 ft

Static Water Column Height: 9.7 ft
Screen Length: 15. ft
Well Radius: 0.083 ft



WELL TEST ANALYSIS

Data Set: C:\...\WW-3 slug.aqt
Date: 10/29/13 Time: 06:25:55

PROJECT INFORMATION

Company: Gould Groundwater
Client: Amphenol
Project: 1087
Location: Plating
Test Well: WW-3
Test Date: 10/18/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.02148 cm/sec
y0 = 8.808 ft

AQUIFER DATA

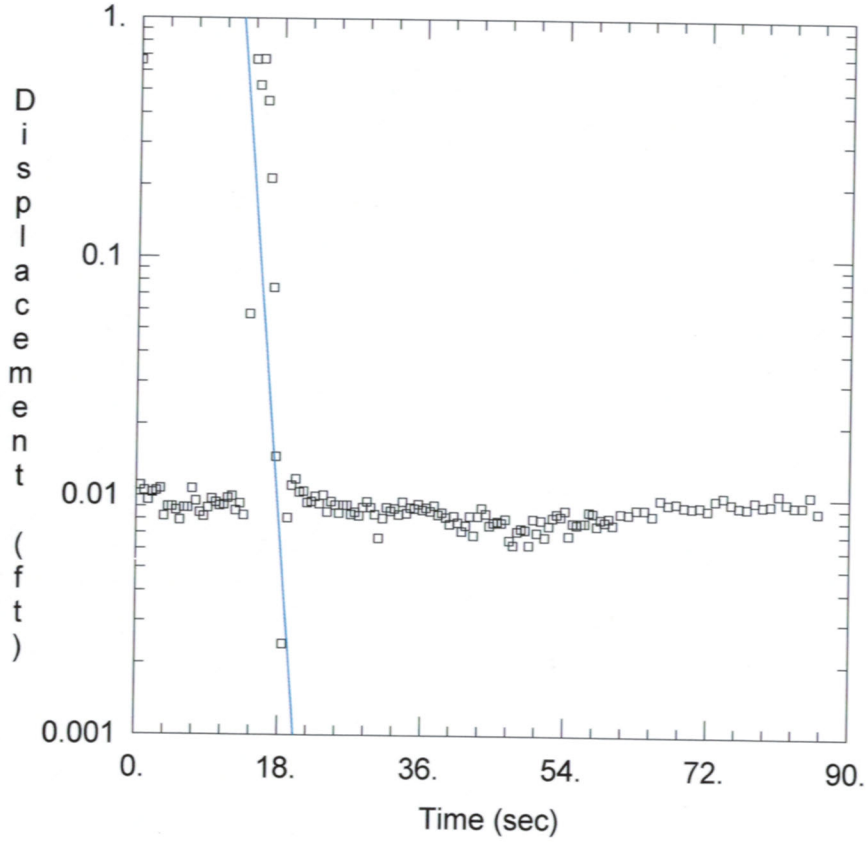
Saturated Thickness: 50. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WW-3)

Initial Displacement: 1.529 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.083 ft

Static Water Column Height: 14.3 ft
Screen Length: 15. ft
Well Radius: 0.083 ft



WELL TEST ANALYSIS

Data Set: C:\...\WW-3 Bail.aqt
Date: 10/29/13 Time: 06:29:38

PROJECT INFORMATION

Company: Gould Groundwater
Client: Amphenol
Project: 1087
Location: Plating
Test Well: WW-3
Test Date: 10/18/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.02425 cm/sec
y0 = 2.703E+5 ft

AQUIFER DATA

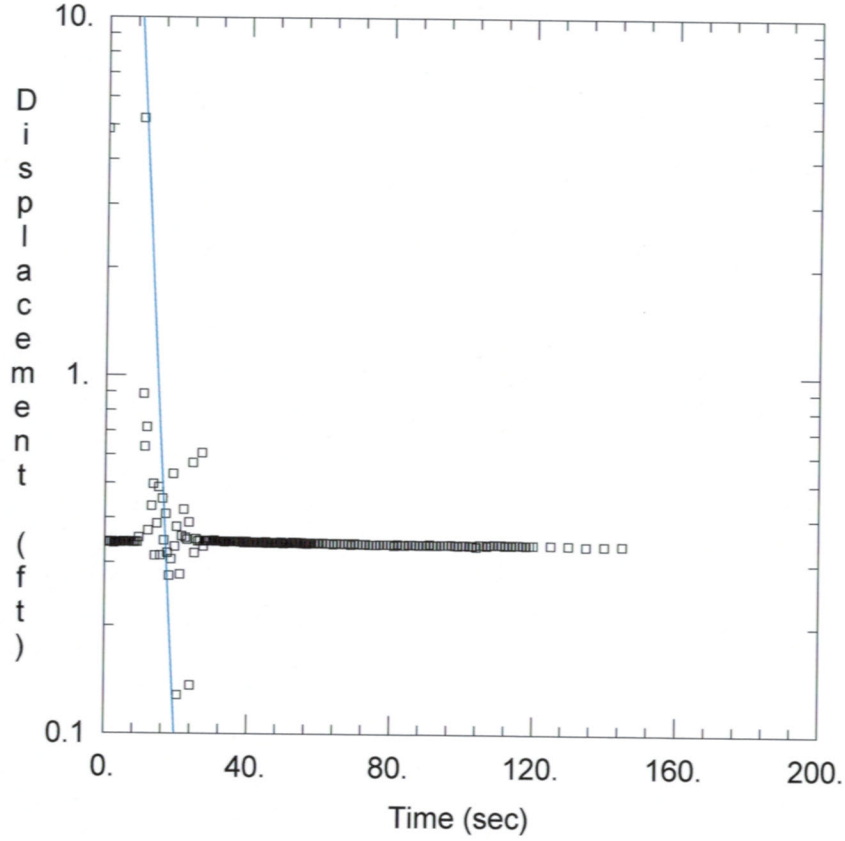
Saturated Thickness: 50. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WW-3)

Initial Displacement: 0.6635 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.083 ft

Static Water Column Height: 14.3 ft
Screen Length: 15. ft
Well Radius: 0.083 ft



WELL TEST ANALYSIS

Data Set: C:\...\WW-4 in.aqt
Date: 10/29/13 Time: 06:33:56

PROJECT INFORMATION

Company: Gould Groundwater
Client: Amphenol
Project: 1087
Location: Plating
Test Well: WW-4
Test Date: 10/18/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.01101 cm/sec
y0 = 588.8 ft

AQUIFER DATA

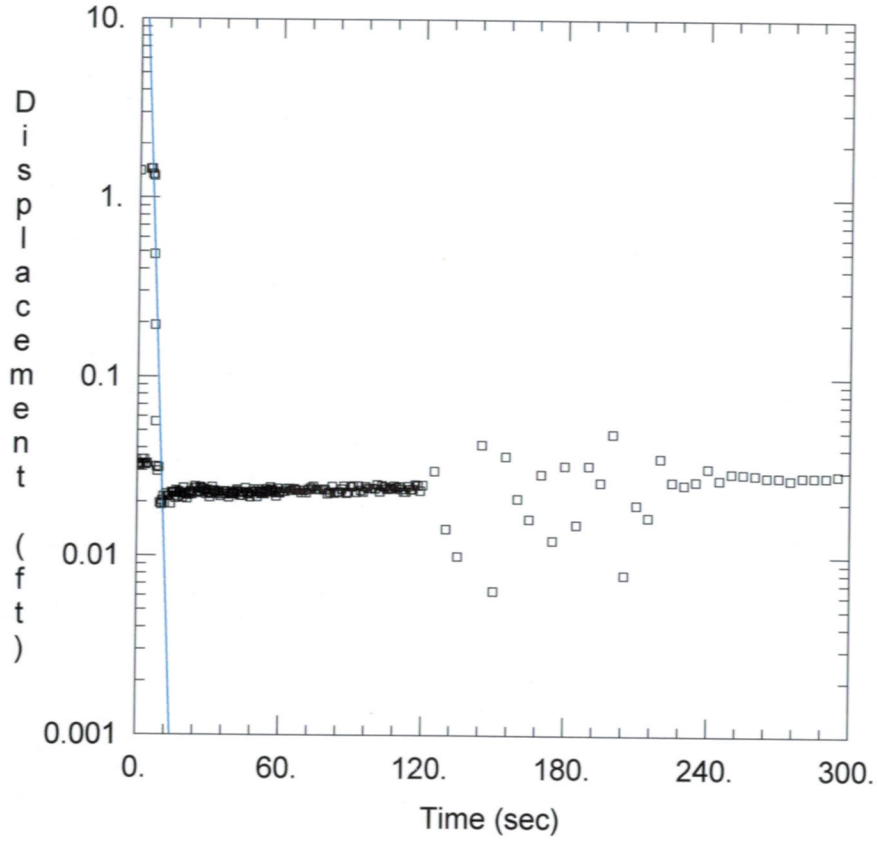
Saturated Thickness: 50. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WW-4)

Initial Displacement: 4.877 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.083 ft

Static Water Column Height: 11.1 ft
Screen Length: 15. ft
Well Radius: 0.083 ft



WELL TEST ANALYSIS

Data Set: C:\...\WW-4 out.aqt
Date: 10/29/13 Time: 06:37:32

PROJECT INFORMATION

Company: Gould Groundwater
Client: Amphenol
Project: 1087
Location: Plating
Test Well: WW-4
Test Date: 10/18/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.01977 cm/sec
y0 = 85.14 ft

AQUIFER DATA

Saturated Thickness: 50. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WW-4)

Initial Displacement: 1.409 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.083 ft

Static Water Column Height: 11.1 ft
Screen Length: 15. ft
Well Radius: 0.083 ft