URS

November 6, 2017

Mr. Eugene Melnyk, PE
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, NY 14203

RE: NYSDEC Standby Contract D007622
American Axle Site, Site No. 915196
Pumping Test and Slug Test Letter Report
WA # D007622-44

Dear Mr. Melnyk:

URS Corporation (URS) is pleased to present the New York State Department of Environmental Conservation (NYSDEC) with this Letter Report summarizing work completed in September 2017 at the above referenced site. The work was performed in accordance with the Task 4 Scope of Work approved by NYSDEC on September 9, 2017, with the following exception. Due to low recharge and low water table conditions the pumping test as originally planned for the Fill zone wells could not be performed. Instead, bail-down recovery tests were performed at several Fill zone wells to provide hydraulic data for this zone.

This letter report summarizes the results of the field work, presents the evaluation of the data collected, and makes recommendations for pumping well locations and flow rates.

FIELD ACTIVITES

On September 20, 2017, URS was onsite and began slug tests (hydraulic conductivity tests) at wells CP-24A, CP-25A, CP-26A, and CP-27A. Dataloggers were installed in each well and a stainless steel or polyvinyl chloride (PVC) slugs were lowered into the wells. Due to low hydraulic conductivity in the Clay zone, the tests were allowed to run overnight after putting the slug in.

On September 21, 2017, the slugs were removed from wells (CP-24A, CP-25A, CP-26A, and CP-27A) and the slug out portion (rising-head test) was recorded for the rest of the day. Concurrently, a pump was installed in well CP-25B and step tests were conducted to determine a target flow rate for the longer term test to be conducted the following day. A step test was also attempted at CP-25. There was too little water column to conduct a long term test, so it was determined that bail-down recovery tests would be used to evaluate the Fill zone. The slug tests at the clay zone wells were stopped at the end of day and all equipment was pulled and decontaminated.

On September 22, 2017, the pumping test at CP-25 was conducted. Dataloggers were installed in wells CP-23B through CP-27B and the pump was installed in CP-25B. The pump test was started at a flow rate approximately 2.58 gallons per minute (gpm). Approximately one hour into the test, the pump was stopped. Oil had begun to accumulate at a rate that would soon get to the pump intake. The pumping well was allowed to recover. During this time a synoptic water level/oil thickness gauging round was conducted at several wells in the study area. The pumping test was restarted at a lower rate (~2.22-2.26 gpm). Approximately 2 hours into this test, the pump was shut off because oil had reached the pump intake. Recovery was monitored for the next 2 hours.

Due to the shortened duration of the pumping test it was determined that a constant-head test would be conducted at CP-25B to provide additional data, this was conducted immediately following the recovery phase. All dataloggers were pulled and decontaminated at the end of the day.

On September 25, 2017, baildown-recovery tests were conducted at CP-24, CP-25, and CP-26. These were conducted by bailing all available water out of each well (~1/2 gallon) and immediately installing a datalogger and recording recovery. Constant-head tests were conducted at wells CP-23B and CP-26B. These were conducted by installing a pump and datalogger in each well and pumping at a low rate, maintaining a stabilized water level in each well for several minutes and recording the data. The baildown-recovery tests were stopped at the end of the day and all dataloggers and the pump were pulled and decontaminated.

The originally planned purging and sampling of up to 15 wells has not been performed at this time pursuant to instructions from NYSDEC. All purge water and oil was containerized in three 275 gallon totes provided by East Delevan Properties, LLC (EDP). This was done with the understanding that the water would be treated discharged through the onsite system operated by EDP.

SUMMARY OF RESULTS AND RECOMMENTATIONS

The above tests were analyzed and summarized in the calculation summary attached as Appendix A. Hydraulic conductivities, transmissivities, and storativities were calculated using the AQTESOLV aquifer test analysis software. These parameter values were then used to estimate a pumping rate from the bedrock aquifer using both the Theis formula for nonequilibrium flow to a pumping well and the Theim equation for long term pumping rate estimation. These pumping rates were then adjusted to account for leakage through the overlying clay aquitard to produce a revised estimate of the rate of pumping in each pumping well.

Pursuant to conclusions of the meeting between URS and NYSDEC on October 25, 2017, the proposed pumping scheme will include two systems: One would pump from the bedrock zone to depress the water table near the 5x9 sewer to recover NAPL that otherwise would flow into the drain. The second would pump from the fill and clay zones to recover NAPL present in these zones. This second system was added such that this NAPL could be recovered without having it migrate through the clay to the bedrock wells' cone of depression.

<u>Bedrock Zone</u>

For the Bedrock zone the long term pumping rate is estimated at .06 gpm, and results in a radius of influence of approximately 176 feet (ft). It is recommended to install 3 wells on both sides of the sewer (6 wells in total) each 150 ft (45.7 m) apart in the N-S direction (to ensure overlap of the cones of influence) and each at a distance of 14 ft plus or minus (4.3 m) from the sewer and that these wells become operational at the same time. With this configuration the cones of influence (equivalent to the cones of depression) will grow at approximately the same rate and meet at the sewer. It is important that the wells be spaced the same distance east and west of the sewer but the actual distance from the sewer can be approximately 14 ft as long as both distances from the sewer are the same in wells opposite each other in an east-west direction. Thus, floating oil on each side of the sewer will be drawn away from the sewer.

This conceptual orientation and the expected radius of influence would be expected to recover oil over almost the entire footprint of the 250 Colorado Ave. parcel as referenced in the Remedial Investigation performed by Conestoga-Rover and Associates in 2009.

Fill and Clay Zones

The hydraulic conductivity of the fill and clay zones is much less than that of the bedrock, therefore well spacing must be much closer together. The estimated minimum well spacing required is 30 ft, with estimate flow rates from 0.6 to 5.0 gpm depending on weather conditions/seasonal fluctuations.

Oil thickness gauging data from February 2017 was reviewed and supplemented with data from this phase of field work for the Fill and Clay wells. We targeted areas where oil thickness was 0.20 feet or greater, in an attempt to target areas where a reasonable recoverable quantity of oil likely exists. For the fill wells this occurred in one or more events at the following locations: CP-13, CP-27, CP-28, M-1, M-2, and MW-309. For the clay wells, this occurred in on or more events at the following locations: B-1, B-2, CP-13A, CP-14A, CP-15A, CP-26A, M-1A, MW-14AR, MW-305R, MW-307, MW-400, and T-1A

When plotted all these wells are on the eastern side of the 5 x 9 foot sewer, with the exception of CP-15A, which only had 0.01’ of oil present when gauged during this work. Since so little oil was present at this time at this location it was not considered a necessary area for a recovery well. Based on the 30 foot radius of influence in the clay/fill zone and a corresponding well spacing of 30 feet:

- Three wells are proposed in the vicinity of B-1, MW-305R, and MW-309
- Three wells are proposed in the vicinity of M-1, M-1A, M-2, and MW-400
- Two wells are proposed in the vicinity of B-2, MW-307, CP-13A, and CP-13, and
- One well in the vicinity of CP-14A and MW-14-AR

Conceptual well spacing and radius of influence are shown on Figure 1.

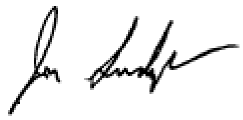
CONCLUSIONS

The various hydraulic conductivity tests and pumping tests conducted at the site provided data that can be used in the design of an interim remedial measure oil pumping system with water depression. It is estimated that nine bedrock wells and nine clay/fill wells will be needed. Based on this information URS will move forward with Basis of Design Report as called for in our Scope of Work.

Please call me with any questions or comments at (716) 856-5636.

Sincerely,

URS Corporation



Jon Sundquist
Project Manager

cc: File: 60548412

FIGURE

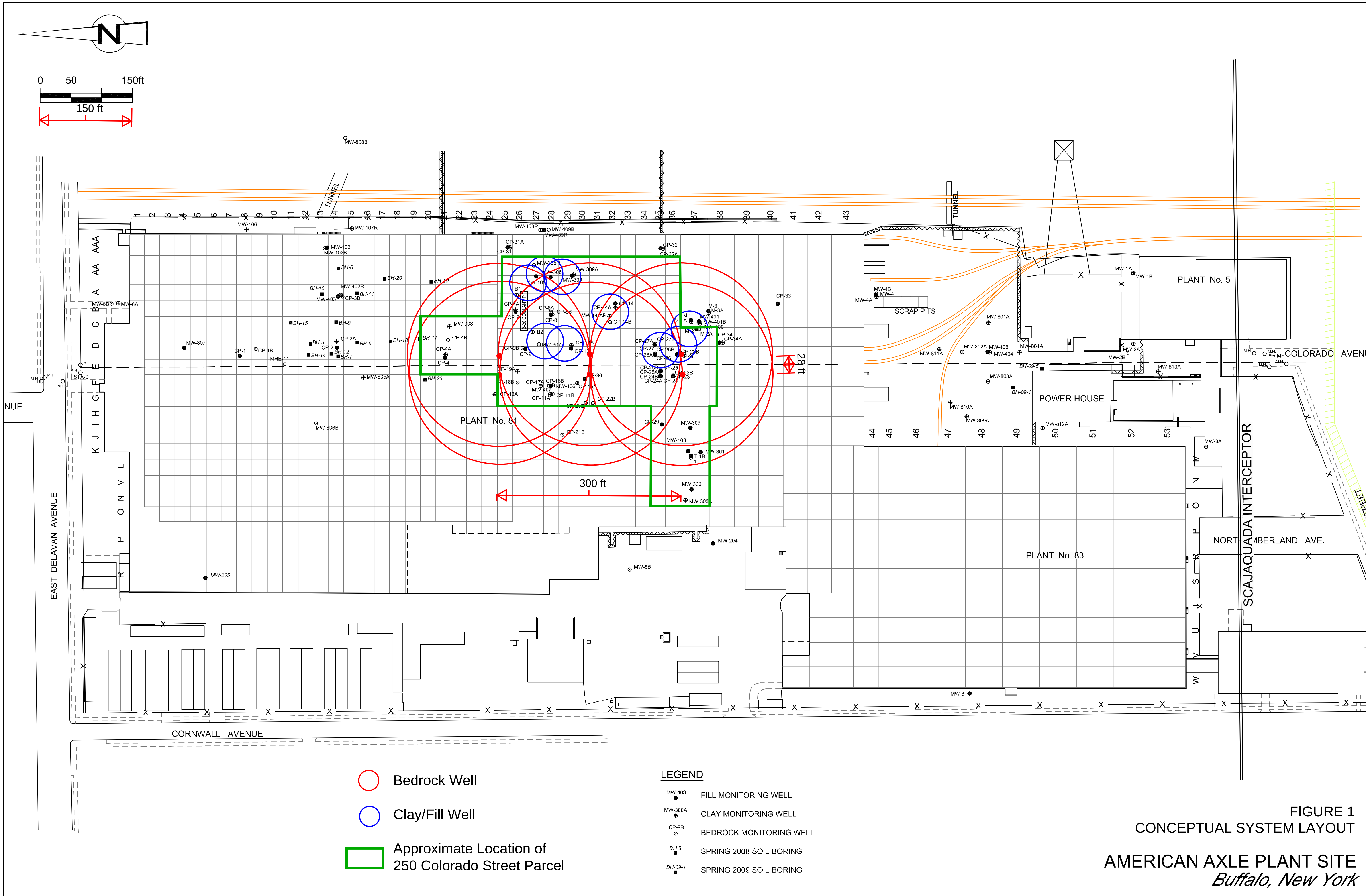


FIGURE 1
CONCEPTUAL SYSTEM LAYOUT

AMERICAN AXLE PLANT SITE
Buffalo, New York

APPENDIX A

CALCULATION SUMMARY

American Axle
Characterization of Hydraulic Properties of Stratigraphic Units Encountered On Site

Table 1 shows the results of aquifer and aquitard testing at the American Axle site.

Table 1 Single Well Tests

Well	Test Method	Hydraulic Conductivity K cm/sec	Method of Analysis	Material Tested
26B	Constant Head	4.8E-5	Jacob-Lohman	Limestone
25B	Constant Head	4.1E-5	Barker	Limestone
23B	Constant Head	7.6E-5	Barker	Limestone
25A	Slug-Falling Head	1.9E-7	Hvorslev	Clay
27A	Slug-Rising Head	5.9E-7	Hvorslev	Clay
26A	Slug-Falling Head	8.5E-7	Hvorslev	Clay
26A	Slug-Rising Head	4.2E-7	Hvorslev	Clay
24	Bail	5.3E-4	Hvorslev	Fill
25	Bail	2.1E-4	Hvorslev	Fill
26	Bail	1.9E-3	Hvorslev	Fill

Pumping Tests in Bedrock Wells

Test 1 was conducted on well 25B on Sept 22, 2017 with the pump turned on at 8:40 am and turned off at 9:45 am. Pumping rate was 2.58 gpm. It was truncated early because the water level in the pumping well was near the pump intake. The pumping well and observation wells are in the bedrock. Results are shown on Table 2.

Table 2 25B Pumping Test 1

Well Name	Well Type	Hydraulic Conductivity K cm/sec	Transmissivity cm^2/sec	Storativity (dimensionless)	Test Method
25B	Pumping Well	4.3E-5	0.0094	0.27	Cooper Jacob
23B	Observation Well	7.6E-5	0.0164	3.5E-6	Cooper Jacob
24B	Observation Well	8.7E-5	0.0187	1.5E-5	Cooper Jacob
26B	Observation Well	6.8E-5	0.0147	4.7E-5	Cooper Jacob
Geometric Mean		6.6E-5	0.0143	1.4E-5	

Note: The geometric mean of storativity does not include the value from the pumping well during the pumping phase which is anomalously higher than the other values and not characteristic of confined or semi-confined aquifers.

Test 2 was started at 11:21 Sept 22, 2017 with a pumping rate of 2.24 gpm with the pump turned off at 13:20. Recovery of water levels was measured until 15:29. Results are shown on Table 3.

Table 3 Well 25B Pumping Test 2

Well Name	Well Type	Hydraulic Conductivity K cm/sec	Transmissivity cm^2/sec	Storativity (dimensionless)	Test Method
25B	Pumping Well	6.6E-5	0.0145	0.07	Theis
25B	Pumping Well	9.1E-5	0.0173	NA	Theis Recovery
24B	Observation Well	6.7E-5	0.0146	6.2E-6	Theis
24B	Observation Well	8.3E-5	0.0179	NA	Theis Recovery
26B	Observation Well	5.8E-5	0.0125	6.7E-5	Theis
26B	Observation Well	4.7E-5	0.0125	NA	Theis Recovery
Geometric Mean		6.7E-5	0.0142	2.0E-5	Theis

Note: NA Not Available with this method
The geometric mean of storativity does not include the value from the pumping well 25B during the pumping phase which is higher than the other values and not characteristic of confined or semi-confined aquifers.

The geometric means of hydraulic conductivity are given in Table 4 below for each formation.

Table 4 Geometric Means and Range of Values

Formation	Geometric Mean Hydraulic Conductivity cm/sec	Range in Values K cm/sec	Geometric Mean Transmissivity cm^2/sec	Geometric Mean Storativity (dimensionless)
Limestone Bedrock	6.2E-5	9.1E-5 to 4.1E-5	0.0143	1.6E-5
Clay Aquitard	4.5E-7	1.9E-7 to 8.5E-7		
Fill	5.94E-4	2.1E-4 to 1.9E-3		

Estimation of Short Term Pumping Rate and Radius of the Cone of Influence of Proposed Pumping Wells in the Bedrock

The available drawdown in pumping well 25B is 11.71 ft (3.57 m) assuming a pump is placed in the bottom of the well and the pump intake is 1 ft (0.3 m) above the bottom of the well. The Theis formula for nonequilibrium flow to a well pumping is (consistent units are required- in this case meters and days):

$$h_0 - h = \frac{Q\,W_u}{4\pi T} \qquad 1)$$

Where: h_0-h is the available drawdown in the pumping well in this case m

Q is pumping rate m^3/day

W(u) is the well function

T is transmissivity m^2/day

u is the argument of W(u) and can be calculated by:

$$u = \frac{r^2 S}{4\pi T} \qquad 2)$$

Where: r is the radius for which the drawdown is to be calculated m

S is storativity calculated from the pumping tests, dimensionless

T transmissivity m^2/day

In pumping well 25B the projected pumping rate after 1 day of operation can be calculated:

$$u = \frac{r^2 S}{4Tt}$$

$$u = \frac{(0.0508)^2(1.6E-5)}{4(0.1236)1}$$

$$u = 8.352E-8$$

Tables of W(u) versus u are consulted for the value of W(u) which is 15.72. The pumping rate with the drawdown (h_0-h) at a distance r from the pumping well can be calculated with the following formula:

$$h_0 - h = \frac{Q\, W_{(u)}}{4\pi T}$$

$$3.57 = Q(10.12)$$

$$Q = 0.3527\ m^3/day = 0.066\ gpm$$

Assuming the predicted pumping rate for one day can be sustained for the long term, the drawdown from pumping this well at a distance of 328 ft (100 m) after 1 year will be 4.81 ft (1.46 m) employing the same equations. The theoretical extent of the radius of the cone of influence is obviously much greater than 328 ft (100 m). This formula does not consider leakage through the clay aquitard which is significant and will decrease the radius of influence considerably. This is discussed below.

Estimation of Long Term Pumping Rate-Bedrock-Alternative Method

The theoretical long-term pumping rate of a well can be determined using the Theim equation. Pumping well 25B was used (consistent units are required):

$$Q = \frac{T(2\pi(h_2 - h_1))}{\ln(\frac{r_2}{r_1})} \qquad 3)$$

Where: Q is pumping rate m^3/day

T is transmissivity m^2/day

h_2 is head in observation well a distance r_2 m from pumping well

h_1 is head in pumping well assumed to be 1 ft. (0.3048 m) above the pump intake

r1 is the well radius, 2” (0.0508 m)

Since the cone of influence of the well pumping at average steady-state pumping rate Q is unknown, the value of r_2 must be estimated. This would be the distance where there is zero drawdown from pumping the well. Therefore h_2 is the static water level in the aquifer which is 13.4 ft bgs in 25B or 12.7 ft (3.87 m) above the bottom of the well. r_2 is arbitrarily selected as 500 ft (152.4 m). Using this arbitrary distance will not introduce too much error because r_2 appears in a log term.

$$Q = \frac{0.1236(2\pi(3.87 - 0.3048))}{\ln(\frac{152.4}{0.0508})}$$

Q = 0.3458 m^3/day = 0.064 gpm which is quite close to the estimate of pumping rate after 1 day. As above, this equation does not consider the effect of groundwater leakage through the clay.

These methods of calculating long term pumping rates assume that there are no 'windows' (i.e. the clay aquitard is assumed to be continuous across the site) through the clay allowing high recharge from the overlying fill into the underlying bedrock.

Calculation of Groundwater Leakage Through the Clay Aquitard

Groundwater flow vertically through the clay aquitard can be calculated using Darcy's Law assuming a maximum vertical hydraulic gradient of 1. The vertical hydraulic conductivity is assumed to be 10% of the horizontal hydraulic conductivity which is 4.5E-7 cm/sec or 3.89E-4 m/day. The assumed vertical hydraulic conductivity is therefore 4.5E-8 cm/sec (3.89E-5 m/day). Flow is calculated through 1 m^2 of aquitard and then calculated for the area of the cone of influence from pumping.

Darcy's Law states:

$$Q = KiA \qquad 4)$$

Where K is the vertical hydraulic conductivity $3.89E - 5$ m/day

i is the hydraulic gradient, assumed to be 1 in the vertical direction

A is the cross-sectional area perpendicular to flow, 1 m^2

$$Q = (3.89E - 5)(1)(1)$$

$$Q = 3.89E - 5 \text{ m}^3\text{/day/m}^2$$

$$= 6.63\text{E-}7 \text{ gpm/ft}^2$$

Flow through the clay in an area of a circle of radius 328 ft (100 m) is 0.224 gpm (1.22 m^3/day). This is approximately 3.5 times more than the predicted pumping rate with no flow through the clay. Back calculating the radius of influence where the flow through the clay equals the pumping rate of 0.066 gpm (0.3527 m^3/day) is 176 ft. (53.7 m).

Estimation of Long Term Pumping Rate-Fill Layer

While it is not possible to obtain an accurate long term pumping rate using analytical equations in the fill, a 'ball park' estimate can be made. The bail tests carried out at the site under relatively dry late summer conditions produced an average drawdown of 0.88 ft (0.267 m) after removal of 0.5 gallons of water. The rate on groundwater inflow into the well just after the water was bailed out can be calculated using Darcy's Law. The height through which flow occurred through the outside of the sand pack of the well from the water surface in the well to the bottom of the well, or in the case of well 26, the fill clay interface is an average of 1.18 ft (0.36 m) for the three wells tested. The horizontal hydraulic gradient is assumed to be 1.0 at the interface between the well and the aquifer. It is also assumed that the water level in the aquifer is the same as the water level in the sand pack immediately after the 0.5 gallons was bailed out of the well. The average area through which flow occurred in the three wells was therefore 2.42 ft^2 (0.225 m^2).

Using Darcy's Law (equation 4) the flow through the saturated portion of the sand pack immediately after bailing was 0.625 gpm (0.115 m^3/day).

The theoretical long-term radius of influence of a well can be determined using the Theim equation (equation 3). Average hydraulic properties including average saturated thickness were used (consistent units are required):

$$Q = \frac{T(2\pi(h_2 - h_1))}{\ln(\frac{r_2}{r_1})}$$

Where: Q is pumping rate (0.115 m^3/day)

T is transmissivity (0.317 m^2/day)

h_2 is head in observation well a distance r_2 m from pumping well assumed to be an average static water level in the fill above the clay layer 2.04 ft (0.622 m)

h_1 is head in pumping well assumed to be 1.16 ft.(0.355 m) above the clay interface

r1 is the well radius including the sand pack, 4” (0.101 m)

Substituting these values into the Theim equation and solving for r_1:

$$0.317 = \frac{0.115}{2\pi(0.622 - 0.355)} \ln\left(\frac{r_2}{r_1}\right)$$

$$0.532 = 0.115 \ln\left(\frac{r_2}{0.101}\right)$$

$$\ln(r_2) - \ln(0.101) = 4.62$$

$$\ln r_2 = 2.33$$

$$r_2 = 10.3\ m$$

The radius of influence of a well pumping in the fill in dry summer conditions at 0.625 gpm (0.115 m3/day) is 33.8 ft (10.3 m). If it is assumed that the average pumping level is approximately 1 ft (0.3 m) above the bottom of the well, then the calculated radius and pumping rate should be more or less what is expected under long term dry conditions. This radius and pumping rate is an approximation. The thickness of the fill and its saturated thickness are probably variable over the site and aquifer parameters may vary from those tested.

Under spring thaw and/or high precipitation conditions when the fill is likely totally saturated, the saturated thickness will be 6.17 ft (1.88 m), an average of the three fill wells tested. The long term pumping rate under these conditions will be significantly greater than under dry conditions.

To determine the approximate maximum pumping rate, the specific capacity of the above average fill well is calculated:

Specific capacity = Q/s

Where: Q is the pumping rate at a specific drawdown s

With a theoretical pumping rate of 0.625 gpm (0.115 m3/day) the drawdown in the well was 0.88 ft (0.267 m). The specific capacity is 0.71 gpm/ft (0.43 m3/d/m). With an available drawdown of 6.17 ft (1.88 m) under high recharge conditions, the theoretical maximum pumping rate is 4.38 gpm (0.81 m3/d) assuming 100% well efficiency.

With varying saturated thicknesses, the transmissivity of the fill will change. Fully saturated the transmissivity is 0.96 m2/d. Since high recharge conditions are a transient condition and the maximum pumping rate of each fill well (assuming a similar well radius and saturated thickness) is approximately 5 gpm (0.9 m3/d).

Multiple pumping wells will be needed in the fill to enable water table depression and capturing the floating oil. These wells should be spaced approximately 30 ft (10 m) apart.

Installed wells for dewatering the fill should be installed to near the base of the clay layer with screens spanning both the entire fill and clay layer to provide additional available drawdown. Pumping a network of wells in an area will allow the water table to decline into the clay layer for most of the year except under high recharge conditions and oil in the clay will migrate towards the pumping wells. This process of migration of oil in the clay will be relatively slow as the hydraulic conductivity of the clay layer is three orders of magnitude lower than that of the fill.

Discussion, Conclusions and Recommendations

The field tests produced relatively consistent values of aquifer parameters for all three formations at the site, the bedrock, overlying clay layer and overlying fill layer. However, there will be some uncertainty in the calculations because of the layer of oil on the piezometric (water table) surface in the bedrock as well as the presence of oil in the clay and fill layers. The other uncertainty arises because the above equations are for confined aquifers and during the pumping the bedrock aquifer will become unconfined around the pumping well.

Calculations indicate that a relatively low pumping rate of 0.066 gpm (0.3527 m^3/day) will occur after one day in well 25B from the bedrock using the 25B well radius and available drawdown as known quantities and assuming no vertical flow through the clay. Assuming the calculated pumping rate is sustainable then the drawdown from pumping for a year will be 4.81 ft (1.46 m) at a distance of 100 m from the pumping well but considering no vertical flow of groundwater through the clay. When factoring in flow through the clay layer which is 6.63E-7 gpm/ft^2 ($3.9E-5$ m^3/day/m^2), the radius of influence where the leakage through the clay equals the long-term pumping rate is 176 ft (53.7 m).

In a theoretical aquifer with a zero horizontal hydraulic gradient, the cone of influence will form a perfect circle in plan view. However, the shape of the cone of influence will be distorted from a perfect circular cone by groundwater flow in the bedrock which is not taken into account by the above equations.

The operation of multiple bedrock wells each pumping at about the same rate starting at the same time will cause the cones of influence to grow radially in all directions until they intersect each other. This interference between wells when the cones of influence intersect will result in somewhat diminished pumping rates and merging of the cones of influence. Seasonal fluctuations in the piezometric surface in the bedrock and water table in the clay and fill will also affect pumping rates.

There is concern that pumping of one or more water table depression wells could cause floating oil to move across the area of the 5 ft x 9 ft sewer and be captured by the sewer. To mitigate this it is recommended to install 3 wells on both sides of the sewer (6 wells in total) each 150 ft (45.7 m) apart in the N-S direction (to ensure overlap of the cones of influence) and each at a distance of 14 ft plus or minus (4.3 m) from the sewer and that these wells become operational at the same time. With this configuration the cones of influence (equivalent to the cones of depression) will grow at approximately the same rate and meet at the sewer. It is important that the wells be spaced the same distance east and west of the sewer but the actual distance from the sewer can be approximately 14 ft as long as both distances from the sewer are the same in wells opposite each other in an east-west direction. Thus, floating oil on each side of the sewer will be drawn away from the sewer.

Elevated water levels in the sewer due to storm events will result in some of this water exiting the sewer in the vicinity of the wells and this water will move toward the water table depression wells effectively flushing oil from the vicinity of the sewer. Subsequently, as described above, the cones of influence will merge in a N-S direction and cause any floating oil between wells to flow to the wells. Pumping rates will likely fluctuate somewhat seasonally because of increased recharge in the Spring; however this is not expected to affect the water table depression functioning of the wells significantly.

Wells installed in the fill and clay layers will vary in pumping rates depending on weather conditions. The variation in rates will be on the order of 0.6 gpm (0.11 m^3/day) to 5 gpm (0.9 $m^{\mathbf{3}}$/d) with a minimum radius of influence on the order of 30 ft (10 m).

After commissioning the water table depression wells and piezometric (bedrock) depression wells, water levels in and around the area of the pumping wells and pumping rates in the wells should be closely monitored to determine long term pumping rates and extent of the cones of influence. Additional fill/clay and bedrock wells may be required in between and outside those initially installed. The need for additional wells will become apparent after a period of several months of monitoring and analysing the results.

The various calculations carried out above are based on many assumptions that may not be true for every area of the site. The calculations should be considered as an approximation of possible pumping rates and radii of influence.

Data Set: C:\Users\ruttand\Documents\AMERICAN AXLE\ANALYZED SLUG TESTS\24.aqt
Date: 10/26/17
Time: 10:03:58

PROJECT INFORMATION

Company: AECOM
Client: American Axle
Project: 60548412
Location: Buffalo
Test Date: 9/22/17
Test Well: 24

AQUIFER DATA

Saturated Thickness: 2. ft
Anisotropy Ratio (Kz/Kr): 0.1

SLUG TEST WELL DATA

Test Well: 24

X Location: 5032.24 ft
Y Location: 5330.86 ft

Initial Displacement: 1. ft
Static Water Column Height: 2. ft
Casing Radius: 0.33 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.34 ft
Screen Length: 2. ft
Total Well Penetration Depth: 7. ft

No. of Observations: 291

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	0.9242	8820.	0.1768
120.5	0.8978	8880.	0.1756
180.	0.8709	8940.	0.1705
240.	0.8225	9000.	0.1691
300.	0.8342	9060.	0.1672
360.	0.8208	9120.	0.1645
420.	0.8089	9180.	0.1607
480.	0.7974	9240.	0.1581
540.	0.7872	9300.	0.156
600.	0.7757	9361.	0.1531
660.	0.7683	9420.	0.1522
720.	0.7566	9480.	0.1489
780.	0.7505	9540.	0.1467
840.	0.7406	9600.	0.1437
900.	0.7334	9660.	0.1416
960.	0.7252	9720.	0.1398
1020.	0.7188	9780.	0.1366

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1080.	0.7103	9840.	0.1338
1140.	0.7039	9900.	0.1328
1200.	0.6968	9960.	0.1287
1260.	0.6905	1.002E+4	0.1278
1320.	0.6837	1.008E+4	0.1259
1380.	0.6778	1.014E+4	0.1236
1440.	0.6705	1.02E+4	0.1218
1500.	0.6649	1.026E+4	0.119
1560.	0.657	1.032E+4	0.1174
1620.	0.653	1.038E+4	0.1161
1680.	0.6454	1.044E+4	0.1144
1740.	0.6402	1.05E+4	0.1121
1800.	0.6325	1.056E+4	0.1093
1860.	0.6284	1.062E+4	0.1067
1920.	0.6238	1.068E+4	0.1049
1980.	0.6169	1.074E+4	0.103
2040.	0.6117	1.08E+4	0.1009
2100.	0.6066	1.086E+4	0.1002
2161.	0.6014	1.092E+4	0.09831
2220.	0.5964	1.098E+4	0.09728
2280.	0.5912	1.104E+4	0.09361
2340.	0.5877	1.11E+4	0.09407
2400.	0.5808	1.116E+4	0.09275
2460.	0.5757	1.122E+4	0.08988
2520.	0.5704	1.128E+4	0.08799
2580.	0.5663	1.134E+4	0.08701
2640.	0.5607	1.14E+4	0.08564
2700.	0.5559	1.146E+4	0.08219
2760.	0.5502	1.152E+4	0.0811
2820.	0.5454	1.158E+4	0.08179
2880.	0.5401	1.164E+4	0.0783
2940.	0.5351	1.17E+4	0.07784
3000.	0.5293	1.176E+4	0.07669
3060.	0.5244	1.182E+4	0.0744
3120.	0.5197	1.188E+4	0.07353
3180.	0.5148	1.194E+4	0.07067
3240.	0.5113	1.2E+4	0.06981
3300.	0.5067	1.206E+4	0.06815
3360.	0.5013	1.212E+4	0.06768
3420.	0.4969	1.218E+4	0.06711
3480.	0.492	1.224E+4	0.06384
3540.	0.4884	1.23E+4	0.06373
3600.	0.4835	1.236E+4	0.06137
3660.	0.4786	1.242E+4	0.06069
3720.	0.4731	1.248E+4	0.05936
3780.	0.4694	1.254E+4	0.05816
3840.	0.4657	1.26E+4	0.05644
3900.	0.4602	1.266E+4	0.05426
3960.	0.4581	1.272E+4	0.05512
4020.	0.4526	1.278E+4	0.05294
4080.	0.4475	1.284E+4	0.05157
4140.	0.4451	1.29E+4	0.05237
4200.	0.4385	1.296E+4	0.0483

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
4260.	0.4346	1.302E+4	0.04887
4320.	0.4321	1.308E+4	0.04703
4380.	0.4257	1.314E+4	0.04606
4440.	0.4217	1.32E+4	0.04428
4500.	0.4189	1.326E+4	0.04359
4560.	0.4155	1.332E+4	0.04268
4620.	0.4116	1.338E+4	0.04136
4680.	0.406	1.344E+4	0.03992
4740.	0.4031	1.35E+4	0.03889
4800.	0.3986	1.356E+4	0.03831
4860.	0.3944	1.362E+4	0.03676
4920.	0.3904	1.368E+4	0.03596
4980.	0.3871	1.374E+4	0.03516
5040.	0.3825	1.38E+4	0.03361
5100.	0.3786	1.386E+4	0.03413
5160.	0.3768	1.392E+4	0.03207
5220.	0.3713	1.398E+4	0.03137
5280.	0.3677	1.404E+4	0.03017
5340.	0.3659	1.41E+4	0.02971
5400.	0.3622	1.416E+4	0.02971
5460.	0.3584	1.422E+4	0.02868
5520.	0.3542	1.428E+4	0.02679
5580.	0.3505	1.434E+4	0.02661
5640.	0.3476	1.44E+4	0.02633
5700.	0.3434	1.446E+4	0.02466
5761.	0.3396	1.452E+4	0.02398
5820.	0.3372	1.458E+4	0.02174
5880.	0.3336	1.464E+4	0.02203
5940.	0.329	1.47E+4	0.02042
6000.	0.3274	1.476E+4	0.02065
6060.	0.3221	1.482E+4	0.01956
6120.	0.3187	1.488E+4	0.01893
6180.	0.3146	1.494E+4	0.01778
6240.	0.3117	1.5E+4	0.01623
6300.	0.3088	1.506E+4	0.01663
6360.	0.3057	1.512E+4	0.01663
6420.	0.3024	1.518E+4	0.01405
6480.	0.2981	1.524E+4	0.01463
6540.	0.2952	1.53E+4	0.01474
6600.	0.2906	1.536E+4	0.01233
6660.	0.2875	1.542E+4	0.01147
6720.	0.2848	1.548E+4	0.01159
6780.	0.2805	1.554E+4	0.009637
6840.	0.277	1.56E+4	0.009695
6900.	0.2745	1.566E+4	0.008715
6960.	0.2734	1.572E+4	0.008206
7020.	0.2676	1.578E+4	0.007344
7080.	0.2659	1.584E+4	0.006424
7140.	0.2616	1.59E+4	0.005734
7200.	0.2586	1.596E+4	0.007571
7260.	0.2549	1.602E+4	0.004932
7320.	0.2519	1.608E+4	0.003384
7380.	0.2499	1.614E+4	0.006595

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
7440.	0.2462	1.62E+4	0.006481
7500.	0.2429	1.626E+4	0.00522
7560.	0.239	1.632E+4	0.002928
7620.	0.2339	1.638E+4	0.002754
7680.	0.2332	1.644E+4	0.001149
7740.	0.2302	1.65E+4	0.001093
7800.	0.2266	1.656E+4	0.000574
7860.	0.2242	1.662E+4	-0.000975
7920.	0.2201	1.668E+4	-0.000403
7980.	0.2161	1.674E+4	-0.002179
8040.	0.213	1.68E+4	-0.002582
8100.	0.2103	1.686E+4	-0.002409
8160.	0.2077	1.692E+4	-0.002349
8220.	0.2049	1.698E+4	-0.003211
8280.	0.2028	1.704E+4	-0.003729
8340.	0.1989	1.71E+4	-0.0039
8400.	0.1958	1.716E+4	-0.005624
8460.	0.1934	1.722E+4	-0.007052
8520.	0.1915	1.728E+4	-0.005792
8580.	0.1876	1.734E+4	-0.004878
8640.	0.1846	1.74E+4	-0.0074
8700.	0.1819	1.746E+4	-0.007229
8760.	0.1779		

SOLUTION

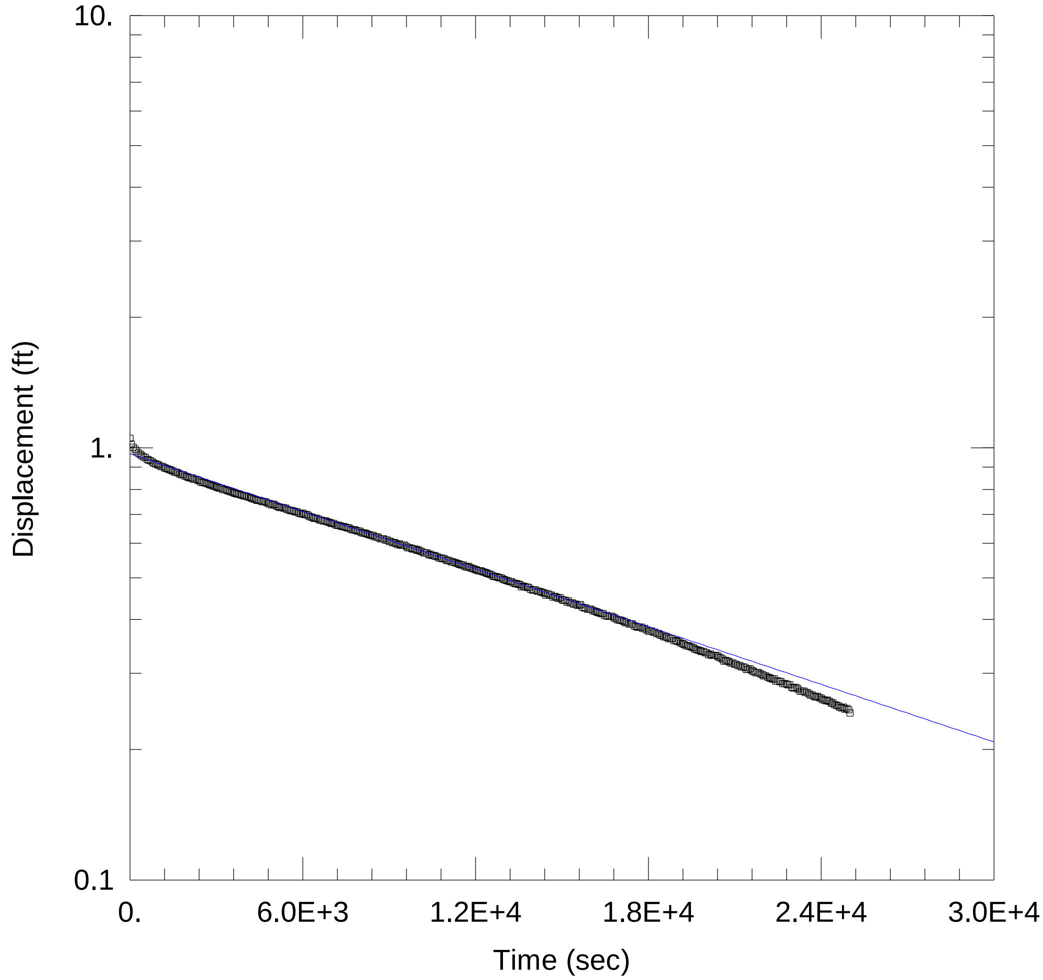
Slug Test
Aquifer Model: Unconfined
Solution Method: Hvorslev
Log Factor: 0.1887

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0005338	cm/sec
y0	0.9169	ft

T = K*b = 0.03254 cm²/sec



WELL TEST ANALYSIS

Data Set: C:\Users\ruttand\Documents\AMERICAN AXLE\ANALYZED SLUG TESTS\25 rising hd.aqt
Date: 10/26/17 Time: 10:25:37

PROJECT INFORMATION

Company: AECOM
Client: American Axle
Project: 60548412
Location: Buffalo
Test Well: 25
Test Date: 9/22/17

AQUIFER DATA

Saturated Thickness: 2.12 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (25)

Initial Displacement: 1.05 ft
Total Well Penetration Depth: 7. ft
Casing Radius: 0.33 ft
Static Water Column Height: 2.17 ft
Screen Length: 2.12 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.0002123 cm/sec y0 = 0.9674 ft

Data Set: C:\Users\ruttand\Documents\AMERICAN AXLE\ANALYZED SLUG TESTS\25 rising hd.aqt
Date: 10/26/17
Time: 10:26:03

PROJECT INFORMATION

Company: AECOM
Client: American Axle
Project: 60548412
Location: Buffalo
Test Date: 9/22/17
Test Well: 25

AQUIFER DATA

Saturated Thickness: 2.12 ft
Anisotropy Ratio (Kz/Kr): 0.1

SLUG TEST WELL DATA

Test Well: 25

X Location: 5039.92 ft
Y Location: 5330.7 ft

Initial Displacement: 1.05 ft
Static Water Column Height: 2.17 ft
Casing Radius: 0.33 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.34 ft
Screen Length: 2.12 ft
Total Well Penetration Depth: 7. ft

No. of Observations: 417

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	1.017	1.26E+4	0.505
120.	1.003	1.266E+4	0.5026
180.	0.9909	1.272E+4	0.5034
240.	0.9811	1.278E+4	0.5012
300.	0.9718	1.284E+4	0.4988
360.	0.9663	1.29E+4	0.4987
420.	0.9586	1.296E+4	0.4965
480.	0.9514	1.302E+4	0.4942
540.	0.947	1.308E+4	0.4935
600.	0.94	1.314E+4	0.4909
660.	0.9365	1.32E+4	0.4902
720.	0.9315	1.326E+4	0.4897
780.	0.9261	1.332E+4	0.4867
840.	0.9209	1.338E+4	0.485
900.	0.918	1.344E+4	0.4846
960.	0.9135	1.35E+4	0.4826
1020.	0.91	1.356E+4	0.4819

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1080.	0.9045	1.362E+4	0.4769
1140.	0.9028	1.368E+4	0.4772
1200.	0.8976	1.374E+4	0.4754
1260.	0.8952	1.38E+4	0.475
1320.	0.8911	1.386E+4	0.4746
1380.	0.8878	1.392E+4	0.4699
1440.	0.8847	1.398E+4	0.4685
1500.	0.8818	1.404E+4	0.4686
1560.	0.8784	1.41E+4	0.4676
1620.	0.8757	1.416E+4	0.4652
1680.	0.8732	1.422E+4	0.4651
1740.	0.8684	1.428E+4	0.4636
1800.	0.8661	1.434E+4	0.4615
1860.	0.8645	1.44E+4	0.4599
1920.	0.8603	1.446E+4	0.4563
1980.	0.8566	1.452E+4	0.4579
2040.	0.854	1.458E+4	0.4558
2100.	0.8503	1.464E+4	0.4549
2160.	0.8494	1.47E+4	0.4507
2220.	0.8458	1.476E+4	0.4521
2280.	0.8446	1.482E+4	0.451
2340.	0.8405	1.488E+4	0.4481
2400.	0.8376	1.494E+4	0.4487
2460.	0.8341	1.5E+4	0.445
2520.	0.8308	1.506E+4	0.4433
2580.	0.8299	1.512E+4	0.4433
2640.	0.8283	1.518E+4	0.4392
2700.	0.8241	1.524E+4	0.4416
2760.	0.8213	1.53E+4	0.4376
2820.	0.8192	1.536E+4	0.4373
2880.	0.8166	1.542E+4	0.4348
2940.	0.8143	1.548E+4	0.4342
3000.	0.8106	1.554E+4	0.4316
3060.	0.8088	1.56E+4	0.4326
3120.	0.8065	1.566E+4	0.4321
3180.	0.8042	1.572E+4	0.4273
3240.	0.8006	1.578E+4	0.4259
3300.	0.8003	1.584E+4	0.4249
3360.	0.7977	1.59E+4	0.4231
3420.	0.7946	1.596E+4	0.422
3480.	0.7917	1.602E+4	0.4225
3540.	0.7895	1.608E+4	0.4199
3600.	0.7869	1.614E+4	0.4187
3660.	0.7844	1.62E+4	0.4167
3720.	0.7811	1.626E+4	0.4159
3780.	0.7798	1.632E+4	0.4145
3840.	0.7792	1.638E+4	0.4121
3900.	0.7763	1.644E+4	0.4122
3960.	0.7721	1.65E+4	0.4085
4020.	0.7722	1.656E+4	0.4084
4080.	0.7697	1.662E+4	0.4077
4140.	0.7672	1.668E+4	0.4076
4200.	0.7657	1.674E+4	0.4065

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
4260.	0.7624	1.68E+4	0.4038
4320.	0.76	1.686E+4	0.4029
4380.	0.7576	1.692E+4	0.4002
4440.	0.7552	1.698E+4	0.3989
4500.	0.7542	1.704E+4	0.3982
4560.	0.7526	1.71E+4	0.3981
4620.	0.7507	1.716E+4	0.3958
4680.	0.7494	1.722E+4	0.3939
4740.	0.7457	1.728E+4	0.3934
4800.	0.7426	1.734E+4	0.3907
4860.	0.7416	1.74E+4	0.3907
4920.	0.738	1.746E+4	0.3903
4980.	0.7393	1.752E+4	0.3871
5040.	0.7357	1.758E+4	0.3858
5100.	0.7326	1.764E+4	0.3844
5160.	0.7305	1.77E+4	0.3843
5220.	0.7274	1.776E+4	0.3836
5280.	0.7273	1.782E+4	0.382
5340.	0.7235	1.788E+4	0.3816
5400.	0.7237	1.794E+4	0.379
5460.	0.7195	1.8E+4	0.3757
5520.	0.7167	1.806E+4	0.3758
5580.	0.7153	1.812E+4	0.3766
5640.	0.7156	1.818E+4	0.3744
5700.	0.7112	1.824E+4	0.3736
5760.	0.709	1.83E+4	0.3718
5820.	0.7089	1.836E+4	0.3707
5880.	0.7055	1.842E+4	0.3684
5940.	0.7036	1.848E+4	0.3672
6000.	0.7038	1.854E+4	0.3653
6060.	0.7	1.86E+4	0.3645
6120.	0.6995	1.866E+4	0.3639
6180.	0.6974	1.872E+4	0.3612
6240.	0.6939	1.878E+4	0.3608
6300.	0.6911	1.884E+4	0.3612
6360.	0.6894	1.89E+4	0.358
6420.	0.687	1.896E+4	0.3574
6480.	0.6859	1.902E+4	0.3568
6540.	0.684	1.908E+4	0.3546
6600.	0.6801	1.914E+4	0.353
6660.	0.6793	1.92E+4	0.3519
6720.	0.6776	1.926E+4	0.3508
6780.	0.6764	1.932E+4	0.348
6840.	0.6746	1.938E+4	0.348
6900.	0.6731	1.944E+4	0.3464
6960.	0.6706	1.95E+4	0.3455
7020.	0.6682	1.956E+4	0.3442
7080.	0.6664	1.962E+4	0.3422
7140.	0.6638	1.968E+4	0.3413
7200.	0.6617	1.974E+4	0.3401
7260.	0.6598	1.98E+4	0.3386
7320.	0.6583	1.986E+4	0.3374
7380.	0.6562	1.992E+4	0.338

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
7440.	0.6553	1.998E+4	0.3353
7500.	0.6549	2.004E+4	0.3354
7560.	0.6517	2.01E+4	0.3322
7620.	0.6507	2.016E+4	0.3329
7680.	0.6481	2.022E+4	0.3308
7740.	0.6452	2.028E+4	0.3302
7800.	0.6441	2.034E+4	0.3306
7860.	0.642	2.04E+4	0.3289
7920.	0.6412	2.046E+4	0.3277
7980.	0.6402	2.052E+4	0.3259
8040.	0.6354	2.058E+4	0.3239
8100.	0.6345	2.064E+4	0.3209
8160.	0.6348	2.07E+4	0.3217
8220.	0.6324	2.076E+4	0.3205
8280.	0.63	2.082E+4	0.3196
8340.	0.6278	2.088E+4	0.3178
8400.	0.6258	2.094E+4	0.3178
8460.	0.6252	2.1E+4	0.3153
8520.	0.6211	2.106E+4	0.3151
8580.	0.6224	2.112E+4	0.3129
8640.	0.6187	2.118E+4	0.3133
8700.	0.6158	2.124E+4	0.3112
8760.	0.615	2.13E+4	0.3112
8820.	0.614	2.136E+4	0.3093
8880.	0.6109	2.142E+4	0.3066
8940.	0.6103	2.148E+4	0.3065
9000.	0.6077	2.154E+4	0.3074
9060.	0.6058	2.16E+4	0.305
9120.	0.6022	2.166E+4	0.3037
9180.	0.6018	2.172E+4	0.301
9240.	0.6007	2.178E+4	0.3013
9300.	0.5974	2.184E+4	0.3016
9360.	0.598	2.19E+4	0.2997
9420.	0.5944	2.196E+4	0.2983
9480.	0.5942	2.202E+4	0.2967
9540.	0.5941	2.208E+4	0.296
9600.	0.591	2.214E+4	0.2942
9660.	0.5871	2.22E+4	0.2929
9720.	0.5861	2.226E+4	0.2927
9780.	0.584	2.232E+4	0.2916
9840.	0.5827	2.238E+4	0.2909
9900.	0.5817	2.244E+4	0.2887
9960.	0.5791	2.25E+4	0.288
1.002E+4	0.5811	2.256E+4	0.2871
1.008E+4	0.576	2.262E+4	0.2873
1.014E+4	0.5746	2.268E+4	0.2845
1.02E+4	0.5707	2.274E+4	0.2843
1.026E+4	0.5709	2.28E+4	0.2838
1.032E+4	0.57	2.286E+4	0.2822
1.038E+4	0.5655	2.292E+4	0.2825
1.044E+4	0.5661	2.298E+4	0.2783
1.05E+4	0.5631	2.304E+4	0.2778
1.056E+4	0.5621	2.31E+4	0.2784

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.062E+4	0.56	2.316E+4	0.2781
1.068E+4	0.5584	2.322E+4	0.2759
1.074E+4	0.5559	2.328E+4	0.2729
1.08E+4	0.5546	2.334E+4	0.2727
1.086E+4	0.5534	2.34E+4	0.273
1.092E+4	0.5524	2.346E+4	0.2712
1.098E+4	0.5504	2.352E+4	0.2708
1.104E+4	0.5484	2.358E+4	0.2693
1.11E+4	0.5471	2.364E+4	0.2678
1.116E+4	0.5442	2.37E+4	0.2675
1.122E+4	0.5438	2.376E+4	0.2654
1.128E+4	0.5418	2.382E+4	0.265
1.134E+4	0.5395	2.388E+4	0.2655
1.14E+4	0.5392	2.394E+4	0.2639
1.146E+4	0.5371	2.4E+4	0.2632
1.152E+4	0.535	2.406E+4	0.2611
1.158E+4	0.5356	2.412E+4	0.2608
1.164E+4	0.531	2.418E+4	0.2597
1.17E+4	0.5298	2.424E+4	0.2602
1.176E+4	0.5303	2.43E+4	0.2585
1.182E+4	0.5272	2.436E+4	0.2556
1.188E+4	0.526	2.442E+4	0.2566
1.194E+4	0.5245	2.448E+4	0.2543
1.2E+4	0.5222	2.454E+4	0.2536
1.206E+4	0.5198	2.46E+4	0.2525
1.212E+4	0.5184	2.466E+4	0.2506
1.218E+4	0.5184	2.472E+4	0.2497
1.224E+4	0.5161	2.478E+4	0.2504
1.23E+4	0.5145	2.484E+4	0.2483
1.236E+4	0.5134	2.49E+4	0.249
1.242E+4	0.5112	2.496E+4	0.2472
1.248E+4	0.5094	2.502E+4	0.2429
1.254E+4	0.5085		

SOLUTION

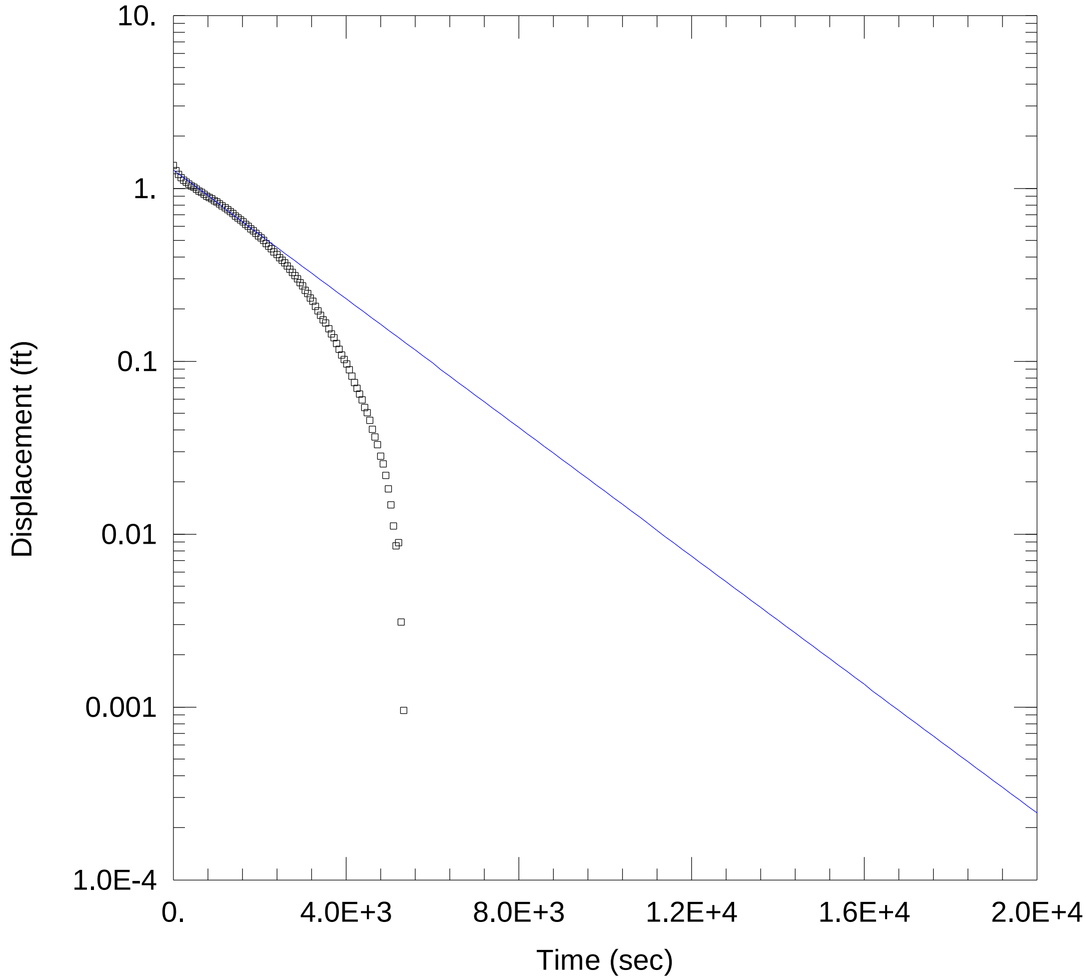
Slug Test
Aquifer Model: Unconfined
Solution Method: Hvorslev
Log Factor: 0.1887

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0002123	cm/sec
y0	0.9674	ft

T = K*b = 0.01372 cm²/sec



WELL TEST ANALYSIS

Data Set: C:\Users\ruttand\Documents\AMERICAN AXLE\ANALYZED SLUG TESTS\26rising hd.aqt
Date: 10/26/17 Time: 10:18:54

PROJECT INFORMATION

Company: AECOM
Client: American Axle
Project: 60548412
Location: Buffalo
Test Well: 26
Test Date: 9/21/17

AQUIFER DATA

Saturated Thickness: 2. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (26)

Initial Displacement: 1.35 ft
Total Well Penetration Depth: 8. ft
Casing Radius: 0.33 ft
Static Water Column Height: 2.7 ft
Screen Length: 2.7 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.001882 cm/sec y0 = 1.272 ft

Data Set: C:\Users\ruttand\Documents\AMERICAN AXLE\ANALYZED SLUG TESTS\26rising hd.aqt
Date: 10/26/17
Time: 10:19:32

PROJECT INFORMATION

Company: AECOM
Client: American Axle
Project: 60548412
Location: Buffalo
Test Date: 9/21/17
Test Well: 26

AQUIFER DATA

Saturated Thickness: 2. ft
Anisotropy Ratio (Kz/Kr): 0.1

SLUG TEST WELL DATA

Test Well: 26

X Location: 5066.84 ft
Y Location: 5339.29 ft

Initial Displacement: 1.35 ft
Static Water Column Height: 2.7 ft
Casing Radius: 0.33 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.34 ft
Screen Length: 2.7 ft
Total Well Penetration Depth: 8. ft

No. of Observations: 269

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	1.259	8160.	-0.04963
120.	1.198	8220.	-0.05119
180.	1.155	8280.	-0.0517
240.	1.117	8340.	-0.04905
300.	1.084	8400.	-0.05156
360.	1.055	8460.	-0.05106
420.	1.029	8520.	-0.05334
480.	1.009	8580.	-0.05306
540.	0.9837	8640.	-0.05198
600.	0.9637	8700.	-0.05464
660.	0.9464	8760.	-0.05334
720.	0.9245	8820.	-0.05335
780.	0.9027	8880.	-0.05319
840.	0.8842	8940.	-0.05499
900.	0.8653	9000.	-0.05512
960.	0.8474	9060.	-0.05498
1020.	0.8292	9120.	-0.05498

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1080.	0.8095	9180.	-0.05534
1140.	0.7899	9240.	-0.05577
1200.	0.7685	9300.	-0.05749
1260.	0.7492	9360.	-0.05877
1320.	0.7301	9420.	-0.05755
1380.	0.7111	9480.	-0.05749
1440.	0.6919	9540.	-0.0587
1500.	0.6752	9600.	-0.05856
1560.	0.6565	9660.	-0.05784
1620.	0.638	9720.	-0.05913
1680.	0.6179	9780.	-0.05962
1740.	0.6017	9840.	-0.05957
1800.	0.5833	9900.	-0.05957
1860.	0.5665	9960.	-0.05899
1920.	0.5478	1.002E+4	-0.05999
1980.	0.5313	1.008E+4	-0.05976
2040.	0.5146	1.014E+4	-0.06112
2100.	0.4976	1.02E+4	-0.06085
2160.	0.4792	1.026E+4	-0.06186
2220.	0.4616	1.032E+4	-0.05985
2280.	0.446	1.038E+4	-0.05999
2340.	0.4298	1.044E+4	-0.06049
2400.	0.4132	1.05E+4	-0.06156
2460.	0.3967	1.056E+4	-0.06256
2520.	0.3822	1.062E+4	-0.05999
2580.	0.3701	1.068E+4	-0.06091
2640.	0.3541	1.074E+4	-0.06362
2700.	0.3406	1.08E+4	-0.06356
2760.	0.327	1.086E+4	-0.06342
2820.	0.3123	1.092E+4	-0.0637
2880.	0.2987	1.098E+4	-0.06263
2940.	0.2846	1.104E+4	-0.06284
3000.	0.2719	1.11E+4	-0.06399
3060.	0.2576	1.116E+4	-0.06299
3120.	0.2451	1.122E+4	-0.06448
3180.	0.2325	1.128E+4	-0.06385
3240.	0.2216	1.134E+4	-0.06385
3300.	0.2078	1.14E+4	-0.06385
3360.	0.1955	1.146E+4	-0.06342
3420.	0.1842	1.152E+4	-0.0627
3480.	0.1728	1.158E+4	-0.06305
3540.	0.1655	1.164E+4	-0.06535
3600.	0.154	1.17E+4	-0.06334
3660.	0.1431	1.176E+4	-0.06578
3720.	0.136	1.182E+4	-0.06613
3780.	0.1269	1.188E+4	-0.06571
3840.	0.1168	1.194E+4	-0.06548
3900.	0.1089	1.2E+4	-0.0632
3960.	0.1022	1.206E+4	-0.06491
4020.	0.09636	1.212E+4	-0.06427
4080.	0.08936	1.218E+4	-0.06556
4140.	0.08185	1.224E+4	-0.06556
4200.	0.07535	1.23E+4	-0.06636

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
4260.	0.06978	1.236E+4	-0.06742
4320.	0.06442	1.242E+4	-0.06706
4380.	0.05963	1.248E+4	-0.06706
4440.	0.05398	1.254E+4	-0.06628
4500.	0.05048	1.26E+4	-0.0672
4560.	0.04533	1.266E+4	-0.0672
4620.	0.04048	1.272E+4	-0.06972
4680.	0.03647	1.278E+4	-0.06578
4740.	0.03297	1.284E+4	-0.06728
4800.	0.02825	1.29E+4	-0.06556
4860.	0.02547	1.296E+4	-0.06798
4920.	0.02189	1.302E+4	-0.06783
4980.	0.01825	1.308E+4	-0.06742
5040.	0.01475	1.314E+4	-0.06835
5100.	0.01111	1.32E+4	-0.0672
5160.	0.008538	1.326E+4	-0.06714
5220.	0.008887	1.332E+4	-0.06663
5280.	0.003104	1.338E+4	-0.06827
5340.	0.000955	1.344E+4	-0.07006
5400.	-0.000179	1.35E+4	-0.06736
5460.	-0.003467	1.356E+4	-0.06884
5520.	-0.004185	1.362E+4	-0.06871
5580.	-0.0102	1.368E+4	-0.06827
5640.	-0.008692	1.374E+4	-0.06685
5700.	-0.00919	1.38E+4	-0.06855
5760.	-0.01119	1.386E+4	-0.06769
5820.	-0.01498	1.392E+4	-0.06783
5880.	-0.01619	1.398E+4	-0.06935
5940.	-0.01655	1.404E+4	-0.06971
6000.	-0.01861	1.41E+4	-0.06578
6060.	-0.02162	1.416E+4	-0.06935
6120.	-0.02227	1.422E+4	-0.06763
6180.	-0.02362	1.428E+4	-0.06927
6240.	-0.02562	1.434E+4	-0.06613
6300.	-0.02705	1.44E+4	-0.06728
6360.	-0.02884	1.446E+4	-0.0702
6420.	-0.02969	1.452E+4	-0.06835
6480.	-0.03184	1.458E+4	-0.06728
6540.	-0.02991	1.464E+4	-0.06748
6600.	-0.03298	1.47E+4	-0.0702
6660.	-0.03327	1.476E+4	-0.06921
6720.	-0.03564	1.482E+4	-0.06884
6780.	-0.0332	1.488E+4	-0.06884
6840.	-0.03569	1.494E+4	-0.07042
6900.	-0.03619	1.5E+4	-0.06964
6960.	-0.03784	1.506E+4	-0.06849
7020.	-0.0387	1.512E+4	-0.07078
7080.	-0.04012	1.518E+4	-0.06914
7140.	-0.03955	1.524E+4	-0.07098
7200.	-0.04249	1.53E+4	-0.06991
7260.	-0.04034	1.536E+4	-0.07035
7320.	-0.04077	1.542E+4	-0.06991
7380.	-0.04291	1.548E+4	-0.07049

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
7440.	-0.04398	1.554E+4	-0.07049
7500.	-0.04519	1.56E+4	-0.06985
7560.	-0.04527	1.566E+4	-0.06971
7620.	-0.04549	1.572E+4	-0.06978
7680.	-0.04656	1.578E+4	-0.07028
7740.	-0.04698	1.584E+4	-0.06842
7800.	-0.04698	1.59E+4	-0.07028
7860.	-0.04684	1.596E+4	-0.06755
7920.	-0.04826	1.602E+4	-0.06991
7980.	-0.04834	1.608E+4	-0.07669
8040.	-0.04992	1.614E+4	-0.07035
8100.	-0.05135		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Hvorslev
Log Factor: 0.1887

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.001882	cm/sec
y0	1.272	ft

T = K*b = 0.1147 cm²/sec