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# Appendix C

## Results of 2023 Pumping Tests at Deep Wells 17S/05E-04A02 and 16S/04E-03G53 in Gonzales and Chualar

MONTGOMERY
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Water Resource Consultants



# TECHNICAL MEMORANDUM

| | | |
|---|---|---|
| **DATE:** | July 14, 2023 | **PROJECT #:** 9100 |
| **TO:** | Salinas Valley Basin Groundwater Sustainability Agency | |
| **FROM:** | Trevor Pontifex and Staffan Schorr | |
| **PROJECT:** | 180/400-Foot Aquifer Subbasin Implementation | |
| **SUBJECT:** | Results of Pumping Tests at Deep Wells 17S/05E-04A02 and 16S/04E-03G53 in Gonzales and Chualar | |

## INTRODUCTION

Montgomery & Associates (M&A) conducted constant-rate pumping tests at 2 deep wells: 1 near Gonzales and the other near Chualar. The tests were within the Phase I extent of the Deep Aquifers as identified through the preliminary investigation of the Deep Aquifers Study; however, they are just outside of the final extent of the Deep Aquifers based on refined AEM data. Therefore, they may be more representative of deep portions of the Eastside Aquifers. Figure 1 shows the test sites in relation to the Phase I and Phase II extents of the Deep Aquifers.

The first test was conducted at agricultural well 17S/05E-04A02 in Gonzales on April 1, 2023; the second was conducted at municipal well 16S/04E-03G53 in Chualar on May 28, 2023. The objective of the tests is to estimate aquifer properties at locations where information on deep aquifer properties is scarce. While these wells are not located within the extent of the Deep Aquifers, the test results provide useful information about groundwater conditions adjacent to the Deep Aquifers. This information will be used to support groundwater modeling and management decisions, and for assessing potential hydraulic connection between the Deep Aquifers and the adjacent aquifer system at these locations in the Salinas Valley.

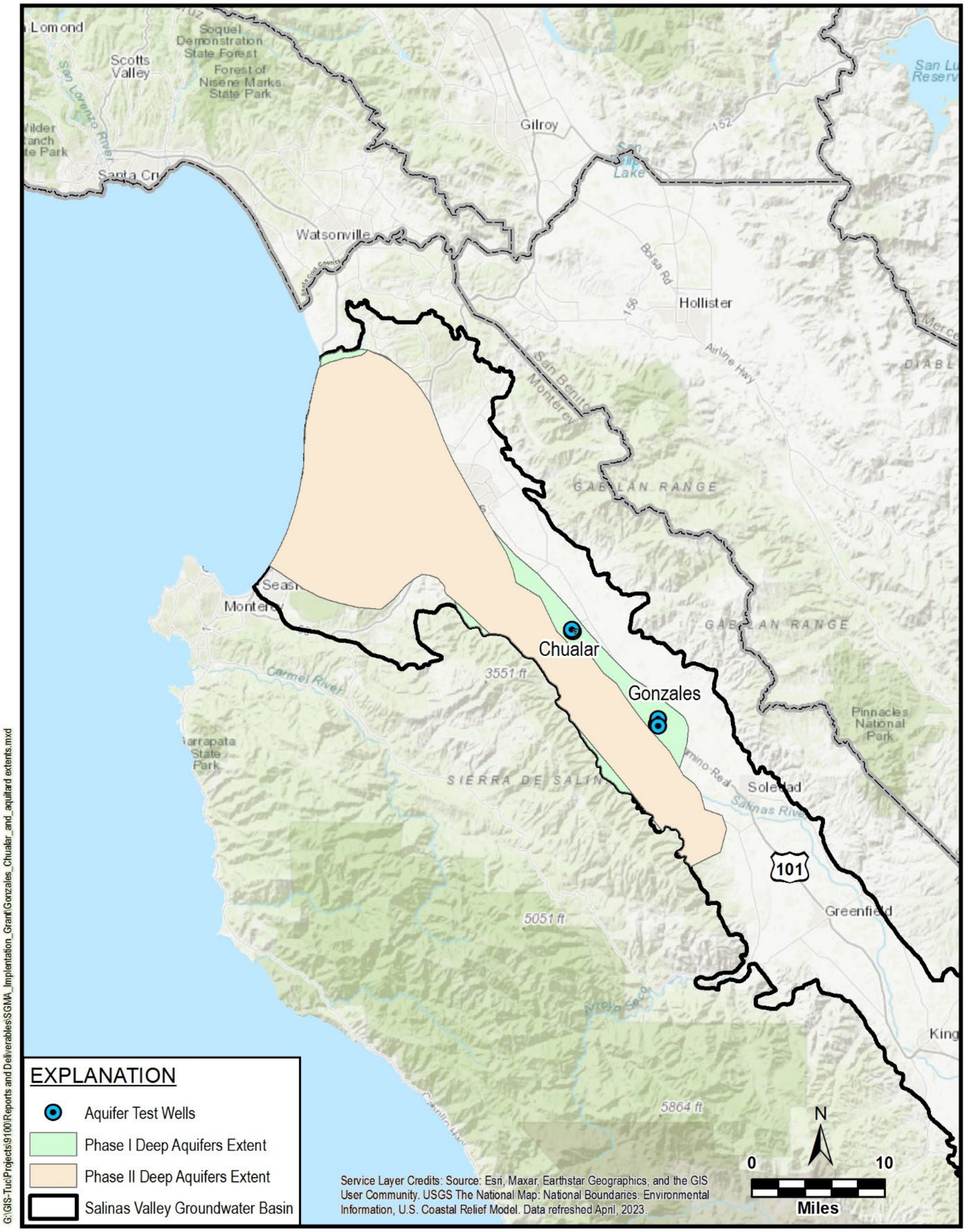



Figure 1. Aquifer Test Locations and Deep Aquifers Extents

## PUMPING TEST LAYOUTS AND PROCEDURES

### Test Layouts

M&A conducted 8-hour constant-rate tests in Gonzales and Chualar. At each test location, data were collected from the pumped well, 1 observation well in the deep aquifer adjacent to the pumped well, and 1 observation well in the overlying 400-Foot Aquifer or its stratigraphic equivalent (referred to the 400-Foot Aquifer for the remainder of the memo). The Gonzales test well (17S/05E-04A02) location and specifications are shown in Table 1 and on Figure 2. The Chualar test well (16S/04E-03G53) location and specifications are shown in Table 2 and on Figure 3.

Table 1. Summary of Gonzales Pumping Test and Monitoring Locations

| | |
|---|---|
| Location | Lanini Ranch, Tavernetti Road, Gonzales, California |
| Test Type | 8-hour constant-rate |
| Average Flowrate | 1,581 gpm[a] |
| Pumping Test Start Date and Time | April 1, 2023, 10:00 a.m. |
| Pumped Well | 17S/05E-04A02<br>16-inch diameter casing<br>Screened from 630 to 1,020 ft bls[b]<br>Completed to 1,020 ft bls |
| Deep Observation Well | 17S/05E-03D03<br>780 ft SE from pumped well<br>16-inch diameter casing<br>Screened from 440 to 560 and 600 to 1,040 ft bls<br>Completed to 1,040 ft bls |
| 400-Foot Aquifer Observation Well | 16S/05E-34M50<br>1,720 ft NNE from pumped well<br>Casing diameter unknown<br>Screened from 330 to 630 ft bls<br>Completed to 630 ft bls |

[a]gpm = gallons per minute
[b]ft bls = feet below land surface

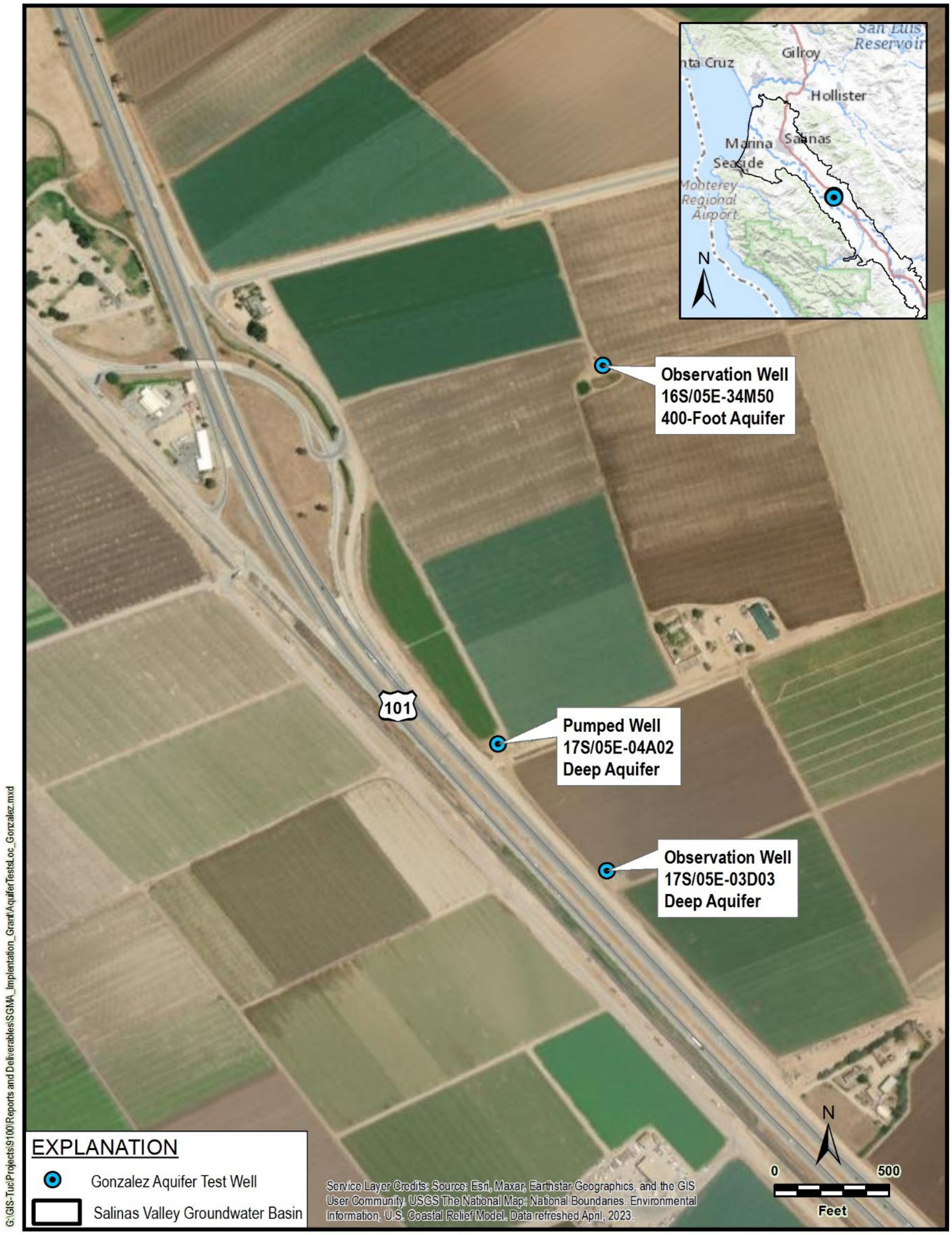



Figure 2. Gonzales Deep Well 17S/05E-04A02 Pumping Test Location

Table 2. Summary of Chualar Pumping Test and Monitoring Locations

| | |
|---|---|
| Location | California American Water Company (Cal-Am)<br>pumping and storage facility, Chualar California |
| Test Type | 8-hour constant-rate |
| Average Flowrate | 400 gpm[a] |
| Pumping Test Start Date and Time | May 28, 2023, 11:00 a.m. |
| Pumped Well | 16S/04E-03G53 (Cal-Am Well #4)<br>12-inch diameter casing<br>Screened from 760 to 900 ft bls[b]<br>Completed to 920 ft bls |
| Deep Observation Well | 16S/04E-03G52 (Cal-Am Well #3)<br>470 ft NW from pumped well<br>12-inch diameter casing<br>Screened from 750 to 900 ft bls<br>Completed to 920 ft bls |
| 400-Foot Aquifer Observation Well | Chualar Union Elementary School well<br>910 ft NNW from pumped well<br>12-inch diameter casing<br>Screened from 448 to 466 and 527 to 539 ft bls<br>Completed to 600 ft bls |

[a]gpm = gallons per minute
[b]ft bls = feet below land surface

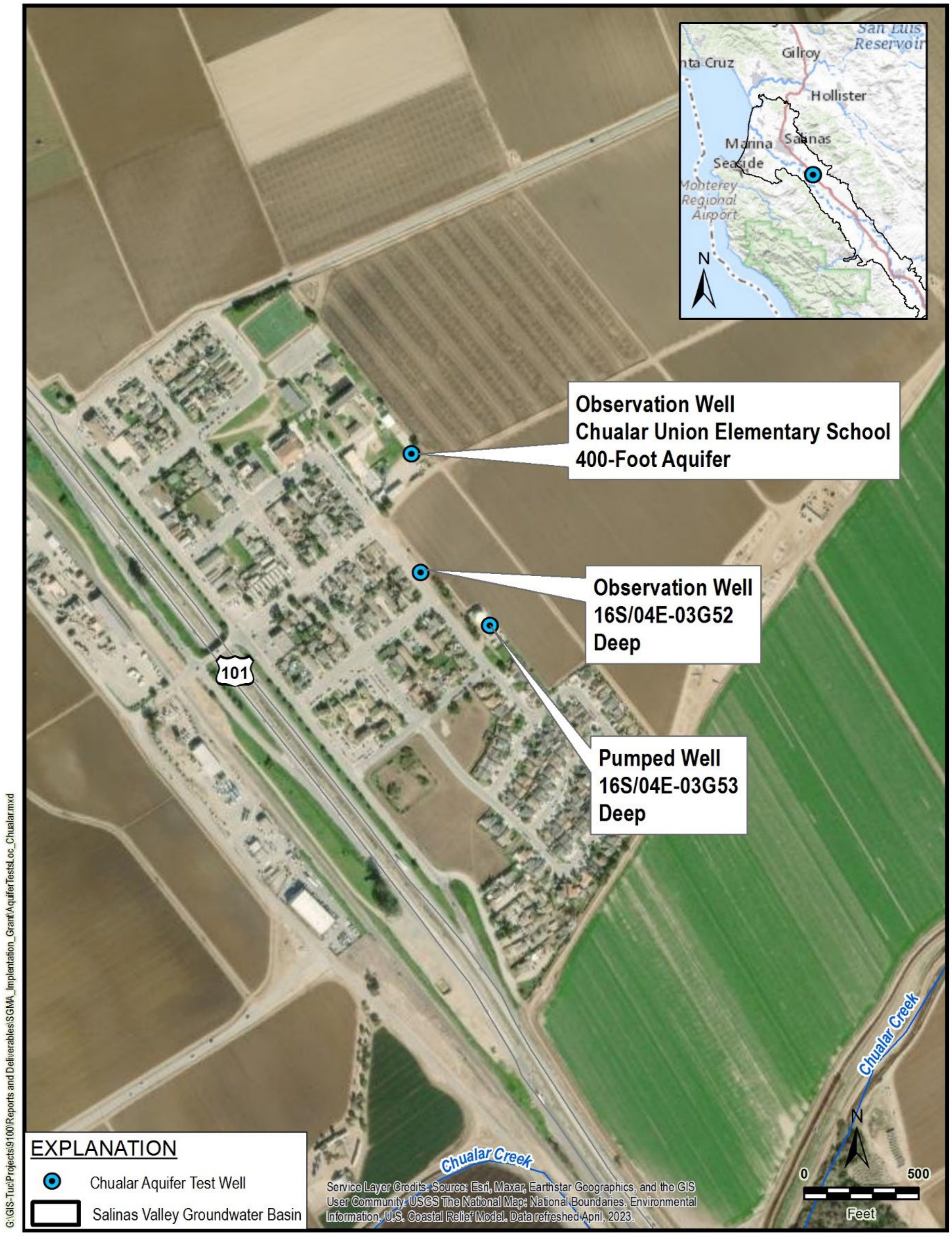



Figure 3. Chualar Deep Well 16S/04E-03G53 Pumping Test Location

## Water Level Monitoring Equipment and Procedures

Water levels were monitored in the pumped well and the observation wells using an In-Situ electric water level sounder and In-Situ Level TROLL 400 and Van Essen Micro-Diver datalogging pressure transducers. The 3 transducers at the Gonzales test site wells automatically recorded water levels at 1-minute intervals. M&A field staff collected manual measurements with an electric sounder at all 3 wells throughout the test to support the transducer data and provide secondary data.

Transducers in both Chualar deep wells automatically recorded water levels at 1-minute intervals. However, the wells had no room for sounder access after the transducers were installed. M&A staff calibrated the transducer data with manual measurements taken immediately before the transducers were installed and immediately after they were removed. The 400-Foot Aquifer observation well located at Chualar Union Elementary School did not have an access tube wide enough for a transducer. M&A field staff obtained manual water level measurements at this well throughout the test.

Background water level monitoring started the day before the aquifer tests and continued for at least 16 hours after pumping stopped, except for the transducer in the 400-Foot Aquifer observation well at Gonzales, which due to time constraints started 2 hours before the test and ended 15 hours after pumping stopped. Water levels in the pumping wells were allowed to equilibrate to background conditions as much as possible, considering the pumping wells are active agricultural water production wells. The Gonzales test began after 19 hours of recovery at pumped well 17S/05E-04A02. The Chualar test began after 12 hours of recovery at pumped well 16S/04E-03G53. It is possible that some nearby wells were pumping during the testing period.

## Flow Monitoring and Discharge Equipment and Procedures

M&A staff monitored flow rates approximately every hour at the Gonzales pumping well and every half hour at the Chualar well using totalizer readings from McCrometer propeller flow meters. Flow rates were not manually adjusted during the tests because rates remained relatively stable. At the Gonzales site, flow rates declined slightly over the 8-hour pumping period, starting at approximately 1,600 gallons per minute (gpm) and ending at approximately 1,560 gpm, with an average rate of 1,581 gpm. The Chualar test flow rate fluctuated slightly from 397 to 403 gpm, with an average rate of 400 gpm.

Pumped water was routed via 4-inch-diameter pipes to agricultural drainage ditches adjacent to the pumped wells. The Gonzales discharge line was part of the permanent farm infrastructure, while the Chualar discharge line was a temporary pipe installed for the tests.

## Aquifer Hydraulic Parameters Estimation Procedures

Transmissivity, hydraulic conductivity, storativity, and specific yield generally define the hydraulic characteristics of an aquifer and control yield to a well (Driscoll, 1986). Drawdown and recovery data from the pumped wells and observation wells at the Gonzales and Chualar sites were processed and analyzed to estimate hydraulic aquifer properties. Data were analyzed using standard analytical solutions provided in the software AQTESOLV Professional 4.50 (HydroSOLVE, 2015). AQTESOLV estimates parameters values by matching theoretical hydraulic responses to observed data at pumping wells and monitoring locations. The analysis workflow involved an iterative process of evaluating various curve-matching solutions for the water level response data based on aquifer assumptions.

Using type-curve matching solutions (Theis, 1935) and semi-log straight-line graphical methods (Cooper and Jacob, 1946), estimates of aquifer parameters were estimated for aquifer transmissivity, hydraulic conductivity, and storativity. Accurate estimations of storativity often require longer term testing and the use of water level response in an observation well separate from the pumped well.

Transmissivity (T) is the product of hydraulic conductivity (K) multiplied by aquifer thickness (b) and is defined as the rate of flow of groundwater through a 1-foot-wide vertical column of aquifer extending through its full saturated thickness under a unit hydraulic gradient (Lohman, 1972). In this report, transmissivity is expressed in cubic feet per day per foot width of aquifer ($ft^3/d/ft$), which simplifies to square feet per day ($ft^2/d$). Hydraulic conductivity is the quotient of transmissivity divided by aquifer thickness and is defined as the rate of flow under groundwater through a square foot of aquifer under a unit hydraulic gradient (Lohman, 1972). In this report, hydraulic conductivity is expressed in feet per day (ft/d).

Storativity is defined as the volume of water that an aquifer releases or takes into storage per unit surface area of the aquifer per unit change in head (Lohman, 1972), and is dimensionless.

# GONZALES PUMPING TEST RESULTS AND ANALYSIS

The Gonzales 8-hour constant-rate pumping test was conducted on April 1, 2023. The test consisted of 480 minutes (8 hours) of pumping at approximately 1,581 gpm, followed by 16 hours of monitored recovery, which ended on April 2, 2023.

Prior to initiating the Gonzales test, groundwater levels were allowed to recover to near-background conditions. Groundwater levels gradually rose at approximately 0.005 feet per hour (ft/hr) during most of this recovery period, reaching a height of 102.6 feet below land surface (bls) by 8 a.m. the day of the test, then dropping to 102.7 feet bls by the 10 a.m. start time. The pre-pumping water level in the pumped well was 102.7 feet bls.

The maximum measured drawdown during the test was approximately 30 feet in the pumped well and approximately 5 feet in deep observation well 17S/05E-03D03. Monitoring data collected at 400-Foot Aquifer observation well 16S/05E-34M50, located approximately 1,700 feet from the pumped well, did not show a water level response to pumping. Manual sounder measurements collected at the pumped and deep observation well closely matched automated transducer measurements.

Pumping stopped at 6 p.m. on April 1. By noon the next day, water levels in both deep wells had recovered to within approximately 1 foot of initial water levels. Figure 4 shows the hydrograph of transducer data from the Gonzales pumping well during the pumping and recovery periods. Figure 5 shows the hydrograph of transducer data from the Gonzales deep monitoring well during the pumping and recovery periods.

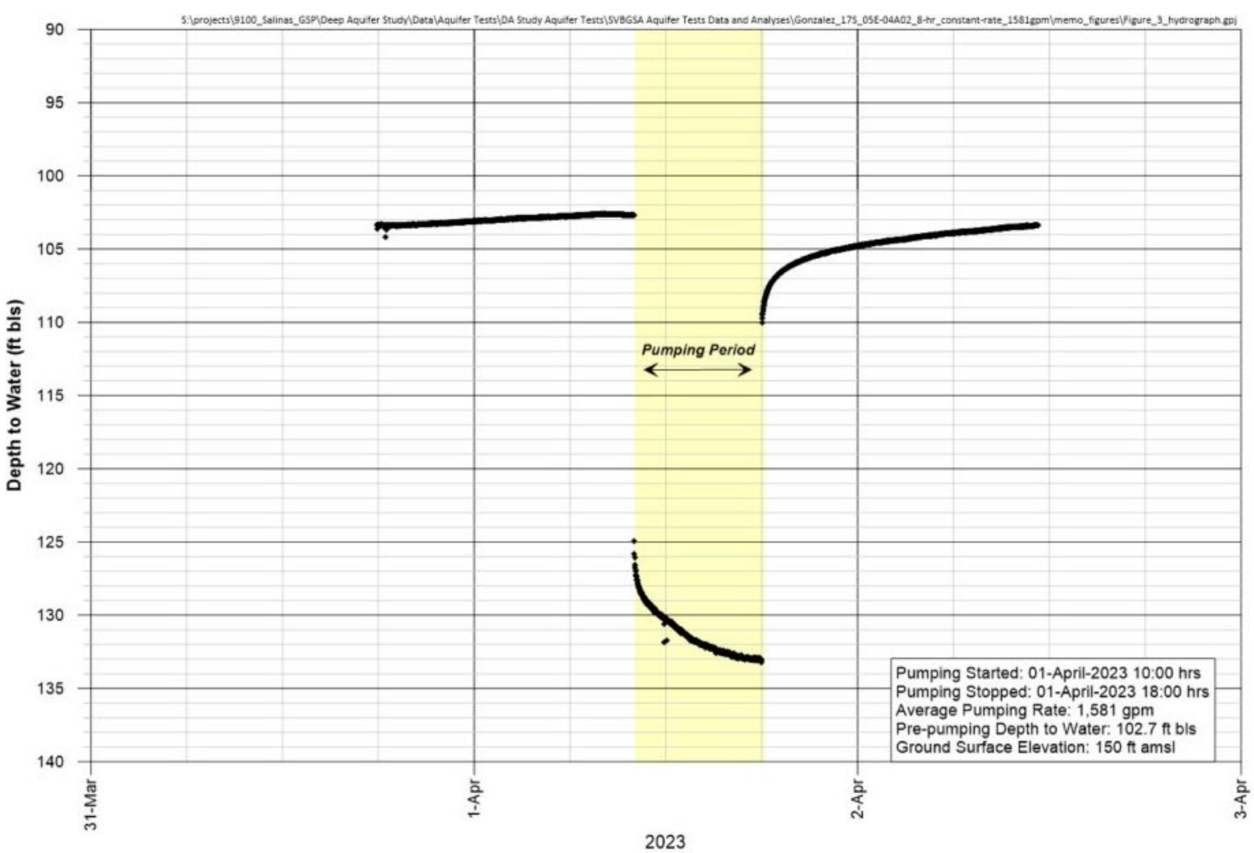



Figure 4. Pumped Well (17S/05E-04A02) Water Level Before, During, and After Constant-Rate Pumping Test at Gonzales

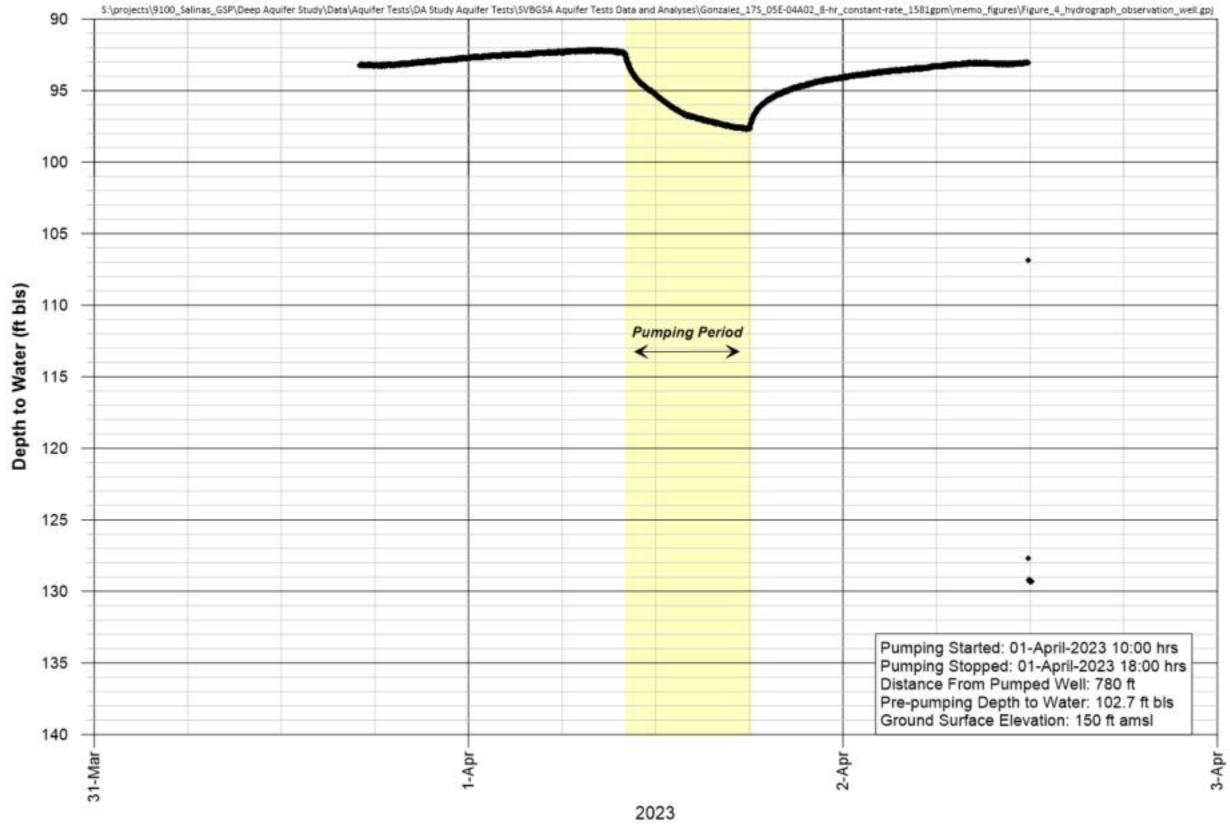



Figure 5. Observation Well (17S/05E-03D03) Water Level Before, During, and After Constant-Rate Pumping Test at Gonzales

The hydrographs on Figure 3 and Figure 4 have a few irregularities where the recovery and drawdown curves are not perfectly smooth. For example, the pretest water levels in the pumped well and the deep observation well stop recovering a couple hours before the test and drop slightly, perhaps due to pumping at a nearby well. The farm that owns the monitored wells agreed not to pump any other wells during the test and M&A staff did not notice any other pumping while they were on site. However, there are several wells on nearby properties that may have been pumping.

Aquifer test analyses included type-curve matching and semi-log straight-line methods, as previously described. These analyses assume a confined aquifer system with a saturated thickness of 410 feet. Saturated thickness is based on the screened intervals of the Gonzales test wells. M&A also tested a leaky aquifer solution (Hantush and Jacob, 1955) that returned largely the same results.

Aquifer test analysis results are shown in Table 3. More detailed summaries of each AQTESOLV analysis are included in Attachment 1. M&A calculated 2 solutions (Theis and Cooper-Jacob) for the pumped well and for the deep observation well for a total of 4 solutions.

At Gonzales, all solutions return a transmissivity of approximately 13,000 $ft^2/d$. Dividing transmissivity by the estimated aquifer saturated thickness of 410 ft gives a hydraulic conductivity of approximately 32 ft/d. Analytical results from the 2 observation well solutions are used to determine storativity, which ranges from $8 \times 10^{-4}$ to $9 \times 10^{-4}$. Dividing the storativity by the saturated thickness of 410 ft yields a range of specific storages of between $1.95 \times 10^{-6}$ and $2.20 \times 10^{-6}$.

Table 3. Summary of Estimated Hydraulic Parameters at Gonzales Pumping Test Wells

| Parameter | Solution Method | Pumped Well 17S/05E-04A02 | Observation Well 17S/05E-03D03 |
|---|---|---|---|
| Initial (Pumping) Water Level (feet bls) | | 102.7 | 92.3 |
| Saturated Thickness (feet)[a] | | 410 | 410 |
| **Transmissivity, feet²/day** | | | |
| Type-curve Matching Method | Theis, 1935 | 13,100 | 12,900 |
| Semi-Log Straight Line Graphical Method | Cooper-Jacob, 1946 | 12,800 | 13,300 |
| **Hydraulic Conductivity, feet/day** | | | |
| Type-curve Matching Method | Theis, 1935 | 32 | 31 |
| Semi-Log Straight Line Graphical Method | Cooper-Jacob, 1946 | 31 | 32 |
| **Storativity (dimensionless)[b]** | | | |
| Type-curve Matching Method | Theis, 1935 | -- | 0.0009 |
| Semi-Log Straight Line Graphical Method | Cooper-Jacob, 1946 | -- | 0.0008 |

[a] Saturated thickness is based on the length between the top of the Deep Aquifers equivalent in the adjacent aquifer and bottom of the pumped well's screened interval.
[b] Storage parameters are not considered reliable estimates for single-well tests where only the pumped well response is analyzed.

The deep observation well has 2 screened intervals. The shallower screen interval extends from 440 to 560 feet bls and may be in connection with water from the overlying 400-Foot Aquifer. The impact of this potential connection on the results of the pumping test analyses is uncertain.

## CHUALAR PUMPING TEST RESULTS AND ANALYSIS

The Chualar 8-hour constant-rate pumping test was conducted on May 28, 2023. The test consisted of 480 minutes (8 hours) of pumping at approximately 400 gpm, followed by 16 hours of monitored recovery

On May 27, the night before the pumping test, the pump in the test well automatically turned on when water levels in the storage tanks dropped below a minimum threshold. The pump was on from approximately 7 p.m. to 11 p.m. Due to this unplanned pumping event, M&A delayed the start of the test the next morning to allow water levels to recover. The water level in the pumped well rose linearly at approximately 0.3 ft/hr for most of this recovery time prior to the test, before leveling off at 118.2 feet bls. The pre-pumping water level at the pumped well was 118.2 feet bls.

The maximum measured drawdown during the test was approximately 9 feet in the pumped well and approximately 2 feet in the deep observation well. Monitoring data collected at the 400-Foot Aquifer observation well at the Chualar school, located approximately 900 feet from the pumped well, did not show a water level response to pumping from the pumped well.

Pumping stopped at 7 p.m. on May 28, and within a few hours groundwater levels in the 2 deep wells recovered to the initial water levels. After 16 hours, water levels in the 2 deep wells were approximately 3 feet higher than initial water levels. Figure 6 shows the hydrograph of transducer data from the Chualar pumping well during the pumping and recovery periods. Figure 7 shows the hydrograph of transducer data from the Chualar deep monitoring well during the pumping and recovery periods.

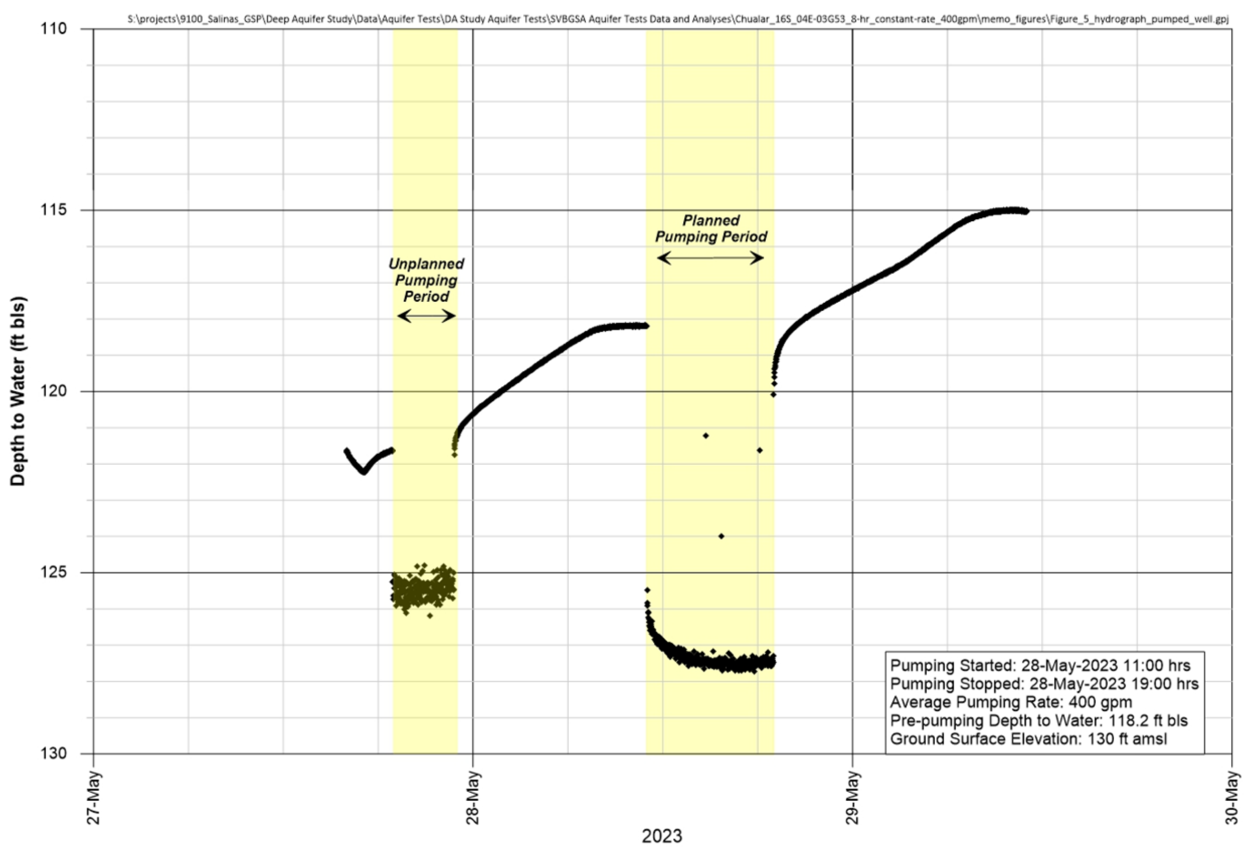



Figure 6. Pumped Well (16S/04E-03G53) Water Level Before, During, and After Constant-Rate Pumping Test at Chualar

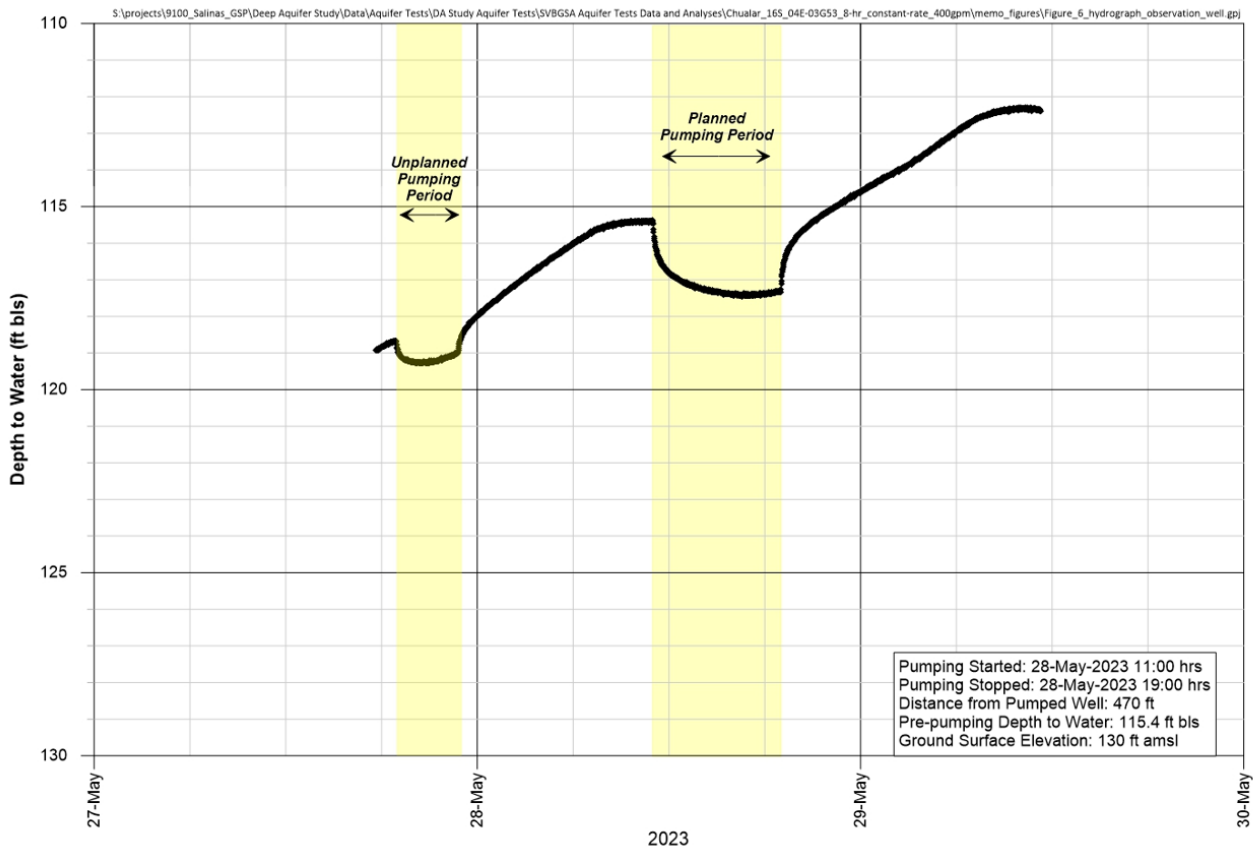



Figure 7. Observation Well (16S/04E-03G52) Water Level Before, During, and After Constant-Rate Pumping Test at Chualar

The Chualar recovery data appear to show pumping interference from 1 or more nearby wells. Water levels at both deep wells were stable in the hour before the test, giving the impression of static water levels; however, post-test water levels recovered 3 feet higher than pre-test levels.

Additionally, there are a few anomalous data points during the planned pumping period on Figure 5 that could be the result of the pump turning off momentarily. However, this phenomenon was not observed by M&A field personnel during the test.

As previously described, aquifer test analyses included type-curve matching and semi-log straight-line methods. These analyses assumes a confined aquifer system with a saturated thickness of 400 feet. Saturated thickness is based on the screened intervals of the deep test wells at Gonzales.

Summaries of each AQTESOLV analysis are included in Attachment 1. Aquifer properties calculated from the Chualar data should be used more cautiously than the Gonzales numbers but may still serve as rough estimates of the true values.

M&A calculated 2 solutions (Cooper-Jacob drawdown and Theis Recovery) for the pumped well and for the deep observation well for a total of 4 solutions. The Cooper-Jacob solutions were fit to the first 200 minutes of drawdown data, excluding any significant pumping interference from other wells. These data also excluded the few data points collected when the pumped well may have momentarily shut off. The Theis Recovery solutions were fitted to only the first 50 minutes of recovery data, excluding any significant pumping interference from other wells. M&A chose these analysis cutoff times based on the AQTESOLV graphs in Attachment 1.

Results are shown in Table 4. Estimated transmissivities ranged between 14,000 and 18,000 $ft^2$/d. Dividing transmissivity by estimated aquifer thickness (400 ft) gives hydraulic conductivities ranging from approximately 36 to 44 ft/d. Only the Cooper-Jacob solution for the observation well is used to determine storativity, which is approximately $2 \times 10^{-4}$. Dividing the storativity by the saturated thickness of 400 feet yields a specific storage of $4 \times 10^{-7}$.

Table 4. Summary of Estimated Hydraulic Parameters at Chualar Pumping Test Wells

| Parameter | Solution Method | Pumped Well 16S/04E-03G53 | Observation Well 16S/04E-03G52 |
|---|---|---|---|
| Initial (Pumping) Water Level (feet bls) | | 118.2 | 115.4 |
| Saturated Thickness (feet)[a] | | 400 | 400 |
| **Transmissivity, feet²/day** | | | |
| Semi-Log Straight Line Graphical Method | Cooper-Jacob, 1946 | 17,600 | 16,000 |
| Semi-Log Straight Line Graphical Method | Theis Recovery, 1935 | 14,400 | 15,900 |
| **Hydraulic Conductivity, feet/day** | | | |
| Semi-Log Straight Line Graphical Method | Cooper-Jacob, 1946 | 44 | 40 |
| Semi-Log Straight Line Graphical Method | Theis Recovery, 1935 | 36 | 40 |
| **Storativity (dimensionless)[b]** | | | |
| Semi-Log Straight Line Graphical Method | Cooper-Jacob, 1946 | -- | 0.0002 |
| Semi-Log Straight Line Graphical Method | Theis Recovery, 1935 | -- | -- |

[a] Saturated thickness is based on the length between the top of the Deep Aquifers equivalent in the adjacent aquifer and bottom of the Gonzales pumped well's screened interval.
[b] Storage parameters cannot be calculated from a pumped well response.

## SUMMARY

The 8-hour pumping periods in these aquifer tests provided adequate data for estimating properties of the deep aquifer system adjacent to the Deep Aquifers. This information will be informative for future modeling for assessing aquifer conditions and future project implementation. Based on these results, hydraulic conductivity is on the order of 30 to 50 ft/d and storativity is on the order of $2 \times 10^{-4}$ to $9 \times 10^{-4}$.

While the tests were successful for providing estimates of aquifer properties, the methods and analyses have some limitations. Due to the relatively short pumping duration, the results are representative of the aquifer in relatively close vicinity of the pumped well, not regional conditions. Longer duration pumping tests were not possible given the water needs of the well owners. A longer duration test could reveal additional information by drawing water from much greater distances. Longer pumping durations could reveal aquifer boundary conditions far from the pumped well and also provide better estimates of regional aquifer properties. Longer tests also make it easier to identify static water levels and patterns in pumping interference.

Analytical solutions generally assume that the aquifer is homogenous and of uniform saturated thickness. In reality, aquifers frequently have heterogenous properties that change across space; the saturated thickness of an aquifer may change based on the gradient of the water table, distribution of underlying confining units, or the variation in the physical framework of the aquifer. Some of the subtle water level responses observed during the pumping and recovery periods could be caused by the heterogenous nature of the aquifer system adjacent to the Deep Aquifers.

## REFERENCES

Cooper, H.H., Jr., and Jacob, C.E., 1946, A generalized graphical method for evaluating formation constants and summarizing well-field history: in American Geophysical Union Transactions, 27:IV, pp. 526–534.

Driscoll, F.G., 1986, Groundwater and Wells. Second edition. A comprehensive study of groundwater and the technologies used to locate, extract, treat, and protect this resource. Published by Johnson Screens, St. Paul, Minnesota.

Hantush, M.S. and C.E. Jacob, 1955. Non-steady Green’s functions for an infinite strip of leaky aquifer, Trans. Am. Geophys. Union, vol. 36, no. 1, pp. 101-112.

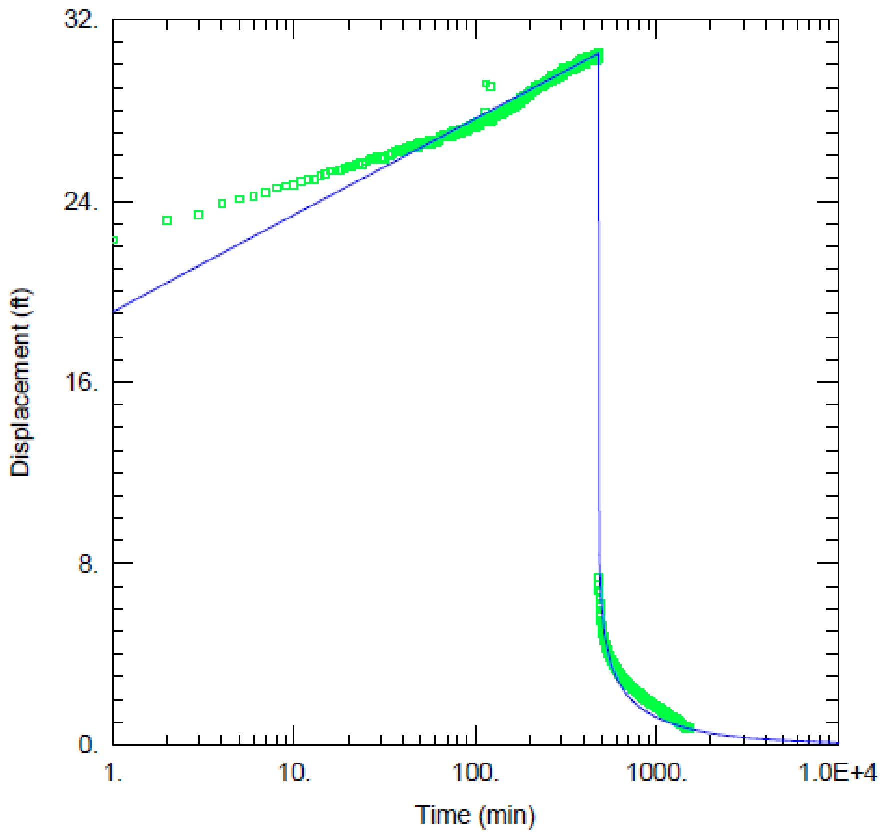
HydroSOLVE, Inc., 2015, AQTESOLV for Windows 95/98/Me/NT/2000/XP/Vista: HydroSOLVE, Inc., Reston, Virginia, version 4.51.010 – Professional.

Lohman, S.W. 1972. Ground-Water Hydraulics. U.S. Geological Survey Professional Paper 708.

Theis, C.V., 1935. The relationship between the lowering of the piezometric surface and the rate and duration of discharge of a well using ground-water storage: American Geophysical Union Transactions, vol. 16, pp. 519-524.

# Attachment 1

# Summaries of AQTESOLV Analysis




17S/05E-04A02 8-HOUR TEST 1,581 GPM

Data Set: S:\...\04A02_Theis-Hantush.aqt
Date: 06/15/23 Time: 14:09:27

PROJECT INFORMATION

Company: M&A
Client: SVBGSA
Project: 9100.3608
Location: Gonzalez, CA
Test Well: 17S/05E-04A02
Test Date: April 1, 2023

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 17S/05E-04A02 | 0 | 0 |

Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 17S/05E-04A02 | 0 | 0 |

SOLUTION

Aquifer Model: Confined

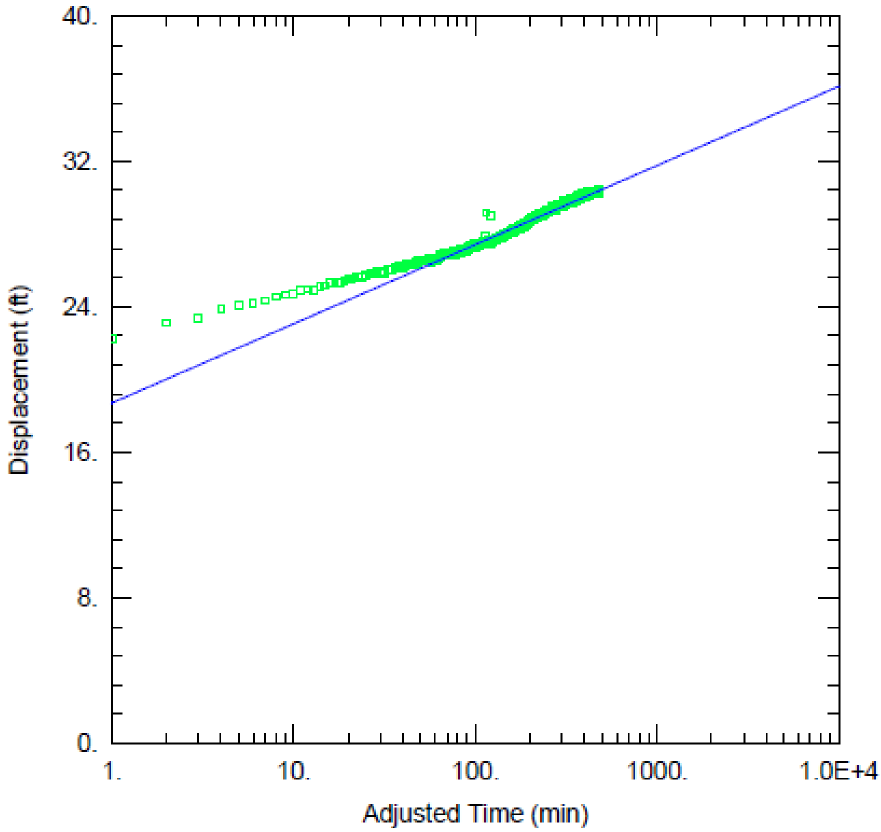
Solution Method: Theis

T = 1.314E+4 $ft^2$/day

S = 0.0009142

Kz/Kr = 0.1

b = 410. ft




17S/05E-04A02 8-HOUR TEST 1,581 GPM

Data Set: \...\04A02_Cooper-Jacob_manualMatch.aqt
Date: 07/05/23 Time: 14:56:06

## PROJECT INFORMATION

Company: M&A
Client: SVBGSA
Project: 9100.3608
Location: Gonzalez, CA
Test Well: 17S/05E-04A02
Test Date: April 1, 2023

## AQUIFER DATA

Saturated Thickness: 410. ft
Anisotropy Ratio (Kz/Kr): 0.1

## WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 17S/05E-04A02 | 0 | 0 |

Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| ▫ 17S/05E-04A02 | 0 | 0 |

## SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 1.28E+4 $ft^2$/day
S = 0.00094

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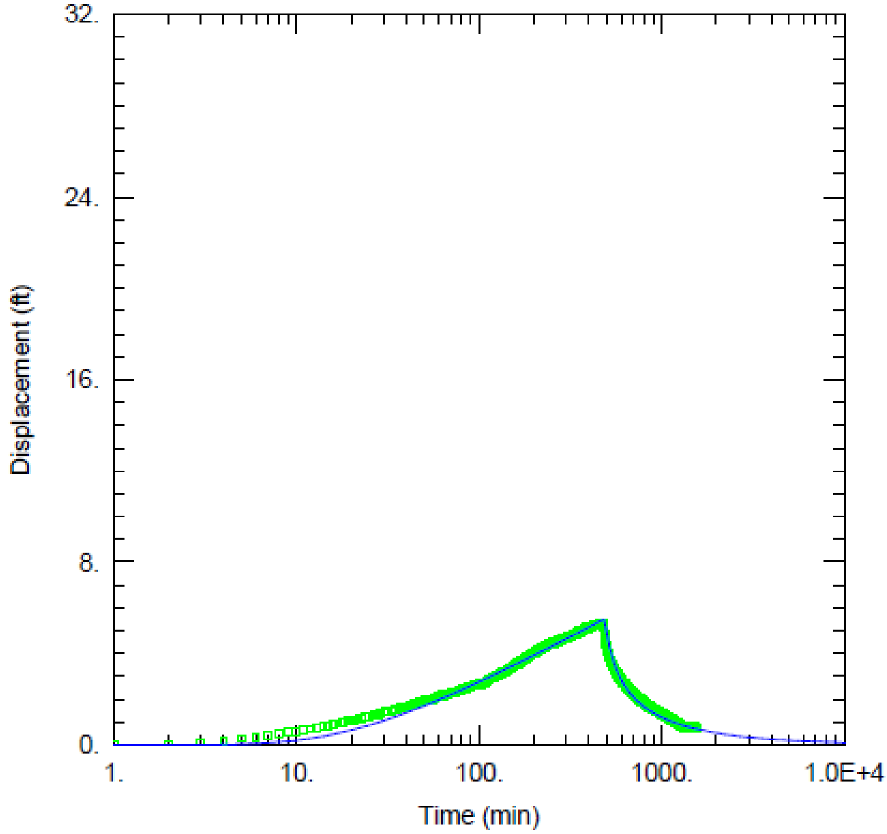



17S/05E-04A02 8-HOUR TEST 1,581 GPM

Data Set: S:\...\03D03_Theis-Hantush.aqt
Date: 06/15/23 Time: 14:13:43

PROJECT INFORMATION

Company: M&A
Client: SVBGSA
Project: 9100.3608
Location: Gonzalez, CA
Test Well: 17S/05E-04A02
Test Date: April 1, 2023

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 17S/05E-04A02 | 0 | 0 |

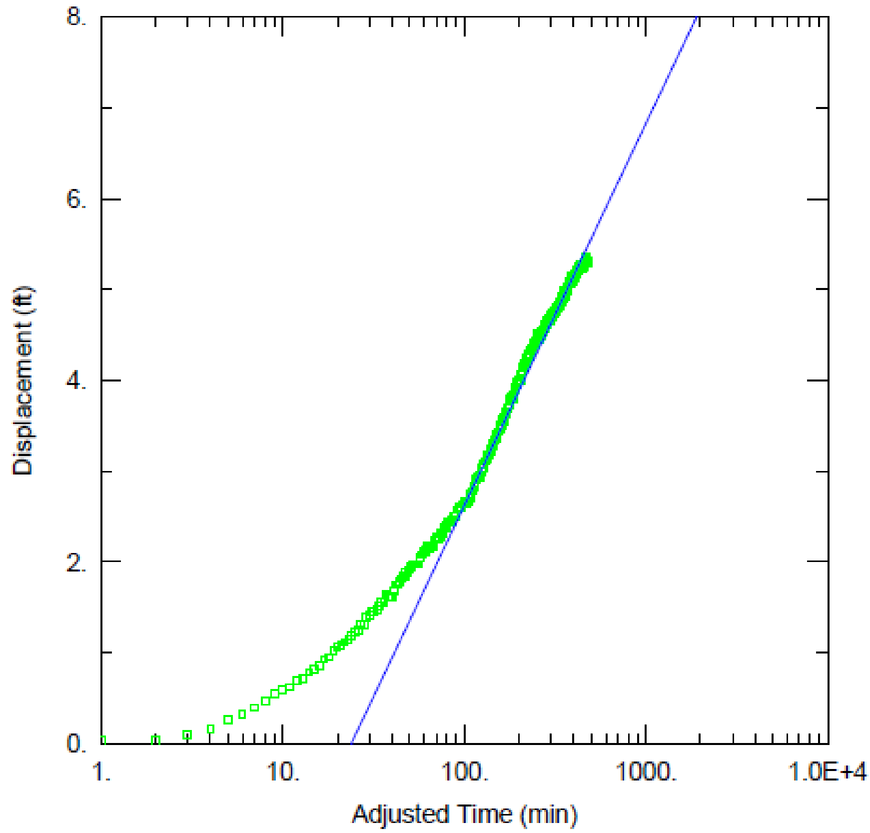
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 17S/05E-03D03 | 552 | -552 |

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 1.288E+4 $ft^2$/day
Kz/Kr = 0.1
S = 0.0008862
b = 410. ft




17S/05E-04A02 8-HOUR TEST 1,581 GPM

Data Set: S:\...\03D03_Cooper-Jacob_manualMatch.aqt
Date: 07/12/23 Time: 13:18:03

PROJECT INFORMATION

Company: M&A
Client: SVBGSA
Project: 9100.3608
Location: Gonzalez, CA
Test Well: 17S/05E-04A02
Test Date: April 1, 2023

AQUIFER DATA

Saturated Thickness: 410. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 17S/05E-04A02 | 0 | 0 |

Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 17S/05E-03D03 | 552 | -552 |

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob

T = 1.325E+4 $ft^2$/day S = 0.0008111

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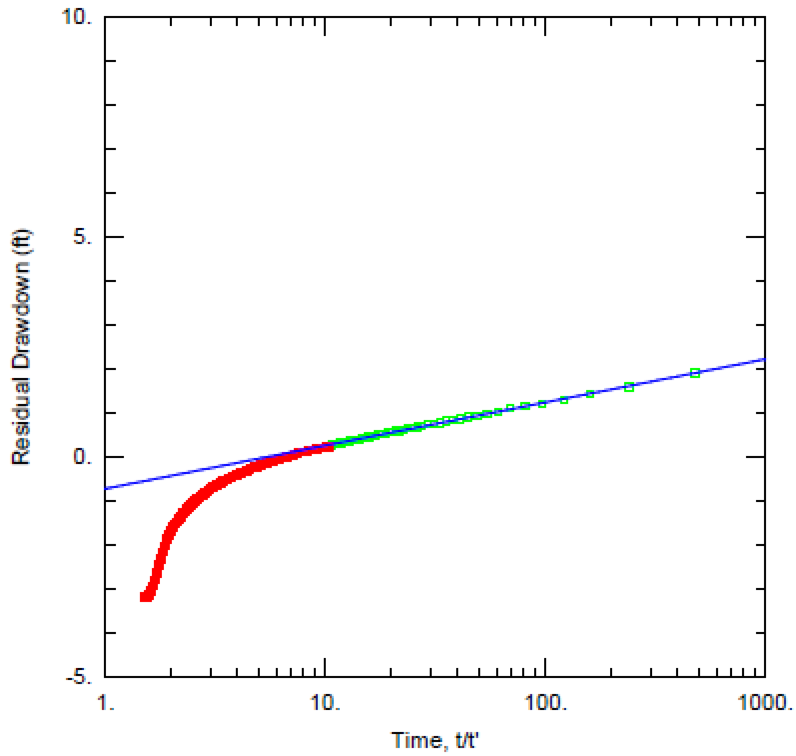



WELL TEST ANALYSIS

Data Set: S:\...\03G53_Theis_Recovery.aqt
Date: 07/12/23 Time: 13:29:57

PROJECT INFORMATION

Company: M&A
Client: SVBGSA
Project: 9100.3608
Location: Chualar, CA
Test Well: 16S/04E-03G53
Test Date: May 28, 2023

AQUIFER DATA

Saturated Thickness: 400. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 16S/04E-03G53 (good data) | 5823582 | 2100132 |

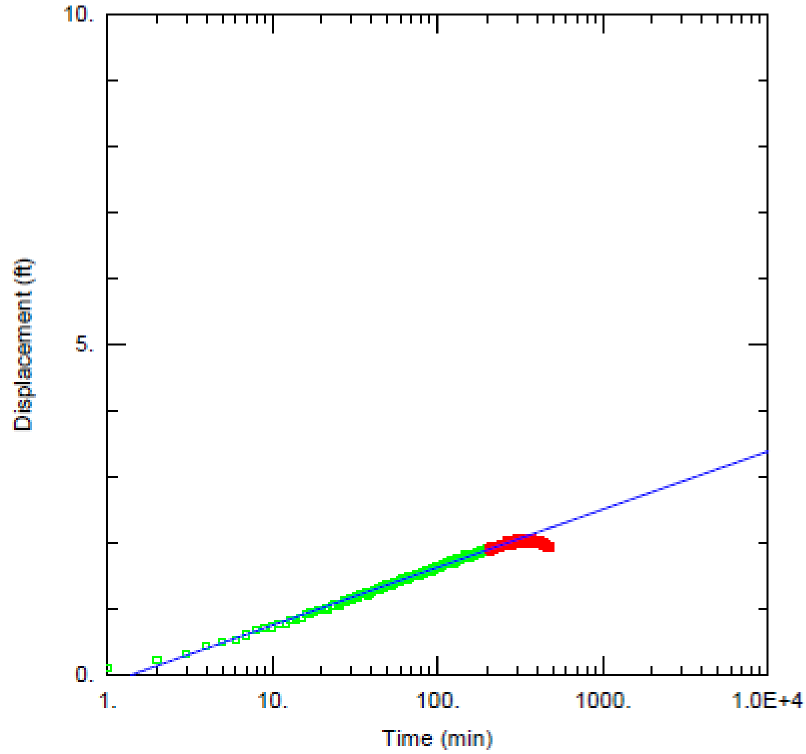
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 16S/04E-03G53 (good data | 5823582 | 2100132 |
| 16S/04E-03G53 (bad data) | 0 | 0 |

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 1.438E+4 $ft^2$/day S/S' = 5.495




WELL TEST ANALYSIS

Data Set: S:\...\03G52_Cooper-Jacob.aqt
Date: 07/12/23 Time: 13:27:39

PROJECT INFORMATION

Company: M&A
Client: SVBGSA
Project: 9100.3608
Location: Chualar, CA
Test Well: 16S/04E-03G53
Test Date: May 28, 2023

AQUIFER DATA

Saturated Thickness: 400. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 16S/04E-03G53 | 5823582 | 2100132 |

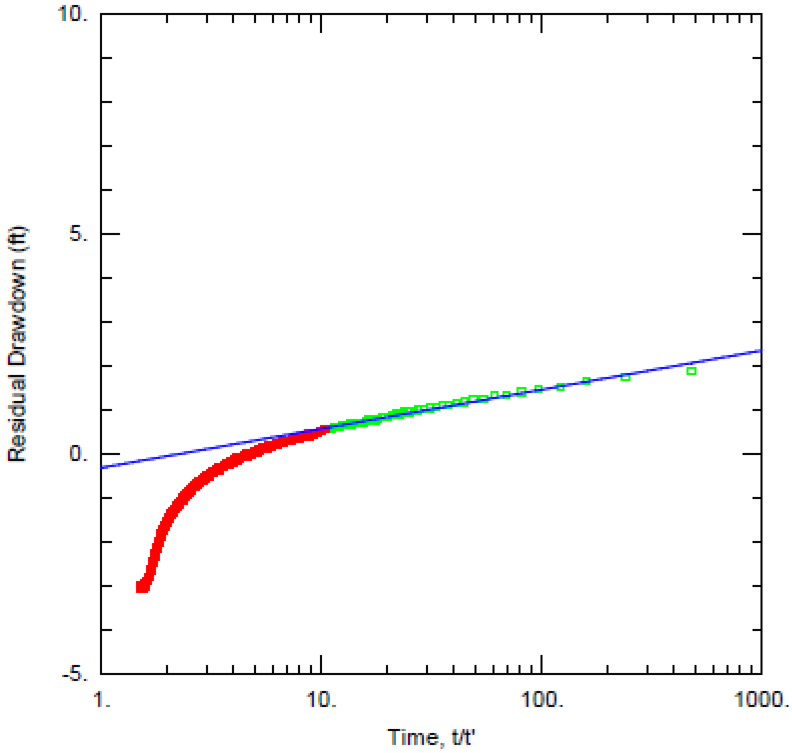
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 16S/04E-03G52 (good data | 5823216 | 2100428 |
| 16S/04E-03G52 (bad data) | 0 | 0 |

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob

T = 1.607E+4 $ft^2$/day S = 0.0001585




## WELL TEST ANALYSIS

Data Set: S:\...\03G52_Theis_Recovery.aqt
Date: 07/12/23 Time: 13:28:20

## PROJECT INFORMATION

Company: M&A
Client: SVBGSA
Project: 9100.3608
Location: Chualar, CA
Test Well: 16S/04E-03G53
Test Date: May 28, 2023

## AQUIFER DATA

Saturated Thickness: 400. ft Anisotropy Ratio (Kz/Kr): 0.1

## WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 16S/04E-03G53 | 5823582 | 2100132 |

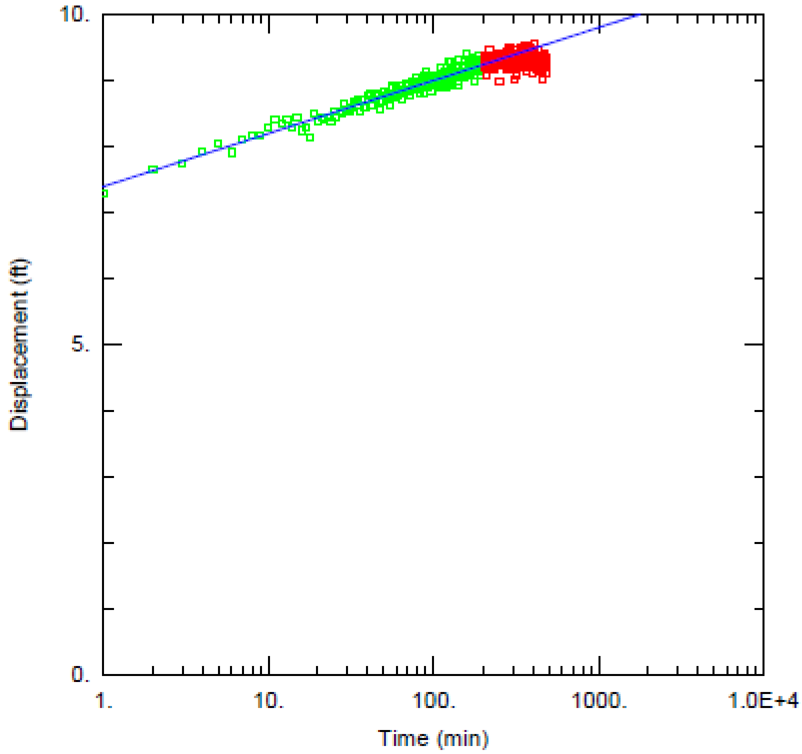
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 16S/04E-03G52 (good data | 5823216 | 2100428 |
| 16S/04E-03G52 (bad data) | 0 | 0 |

## SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 1.589E+4 $ft^2$/day S/S' = 2.282




## WELL TEST ANALYSIS

Data Set: S:\...\03G53_Cooper-Jacob.aqt
Date: 07/12/23 Time: 13:28:38

## PROJECT INFORMATION

Company: M&A
Client: SVBGSA
Project: 9100.3608
Location: Chualar, CA
Test Well: 16S/04E-03G53
Test Date: May 28, 2023

## AQUIFER DATA

Saturated Thickness: 400. ft
Anisotropy Ratio (Kz/Kr): 0.1

## WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 16S/04E-03G53 (good data) | 5823582 | 2100132 |

Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| 16S/04E-03G53 (good dat | 5823582 | 2100132 |
| 16S/04E-03G53 (bad data) | 0 | 0 |

## SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 1.756E+4 $ft^2$/day
S = 1.745E-8