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WATER RESOURCES
WESTERN REGION

CANYON COUNTY SOLID WASTE

15500 MISSOURI AVENUE
NAMPA, IDAHO 83686

October 27, 2021

State of Idaho
Department of Water Resources
Western Regional Office
2735 Airport Way
Boise, ID 83705-5082

RE: Permit No. 63-34858

Dear Mr. Patrick Kelly:

This letter is intended to provide the status of the design and construction of the water rights permit approval for Pickles Butte Sanitary Landfill dated June 4, 2020.

1. The first step in the process was to redevelop and clean out the well and extend the well casing to 1100 feet to prevent collapse. This work was bid in November 2020 and Hiddleston Drilling was selected to conduct the work.
2. The pipe casing was ordered at the end of November 2020 and arrived in February 2021.
3. The well was refurbished between March 31 and April 22, 2021. A copy of the well driller's report is attached (Attachment 1).
4. Based on the construction characteristics of the well (e.g. total depth, screened interval, etc.), a pump was selected and ordered at the end of April 2021. Due to multiple delays associated with the disruption in the supply chain due to the world-wide pandemic, the pump and other parts were not received until August 2021.
5. The pump was installed on August 23, 2021.
6. After installation of the pump, a step-test and a constant discharge test was conducted on August 23 – 25, 2021 to determine the sustainable yield for design of the dust control system. The Technical Memo for the step-test and discharge test is attached (Attachment 2).
7. The design of the Dust Control System was initiated in September 2021 and is ongoing.

Under the permit to develop, work for the development of the well was commenced within five months, but as previously stated there have been numerous supply chain delays associated with the pandemic that have caused delays in the project beyond our control. Canyon County plans to complete the design of the dust control system by November 30, 2021 and immediately begin ordering the water tank and other appurtenances required for construction. Due to the delays already experienced, Canyon County would like to request an extension of the timeline to complete the construction by December 31, 2022. We assume that additional time will be sufficient such that the equipment for the dust control system can be received and installed. We will notify if we encounter

PICKLES BUTTE SANITARY LANDFILL

Tele 208-466-7288 Fax 208-466-7296 email dloper@canyonco.org

any additional delays in receiving the equipment which may affect our ability to meet that deadline.

If you have questions, or would like more information, please reach me via email:

dloper@canyonco.org

Sincerely,

A handwritten signature in black ink, appearing to read "David M. Loper".

David M. Loper, REHS/RS
Director, Canyon County Solid Waste

Attachment 1: Well Drillers Report (well Tag 0089090)

Attachment 2: Pump Test at Well Tag 0089090 for Dust Control

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TETRA TECH

Memo

WATER RESOURCES
WESTERN REGION

To: David Loper, Canyon County Solid Waste

From: William Craig; Maureen McGraw, Tetra Tech

Date: 26 October 2021

Subject: Pump Test at Well Tag 0089090 for Dust Control

1.1 INTRODUCTION AND BACKGROUND

On August 23-25, 2021, Tetra Tech and Hiddleston Drilling conducted a series of step-drawdown aquifer tests and a 10-hour constant discharge rate aquifer test using the Pickles Butte Sanitary Landfill (PBSL) dust suppression well (Well Tag 0089090; aka Stuart Well or Stewart Well). The purpose of the tests were to determine the sustainable well yield for dust suppression water supply. The tests were designed to pump the well long enough to determine if the water level in the well casing would reach a state of equilibrium where no further drawdown would occur. The region around the pumping well where the water level (head) has been lowered is called the cone of depression. When equilibrium has been achieved, the cone of depression stops expanding outwardly because it has reached a recharge boundary or condition where the recharge rate equals the pumping discharge rate. This is also known as steady-state pumping conditions and is analogous to sustainable well yield, which is the target flow rate for the design of the dust suppression system water supply.

The aquifer testing was conducted using a dedicated submersible pump, motor, drop pipe, and flow meter supplied by Hiddleston, a pressure transducer permanently installed in the well, and communication cable. The transducer depth was set at a depth of approximate 584 feet below ground surface(bgs) and the pump depth set to approximately 600 feet bgs.

Earlier in 2021, Hiddleston Drilling extended the cased portion of the Canyon County Landfill dust suppression well with a 5-inch steel casing sleeve down to the total depth of the well 1,130 feet bgs. The well was previously deepened by others, but the lower portion was uncased and was susceptible to loss of total depth due to cave-ins and well bore annular space sloughing. Hiddleston perforated the well casing over two intervals; from 500 to 520 feet bgs and from 1,050 to 1,130 feet bgs. It is unclear why the upper portion of the sleeve was perforated. The casing perforations were made with a downhole perforator in rows of ¼-inch width. A copy of the Canyon County Landfill well log is attached.

The well was reportedly not developed after rehabilitation by Hiddleston, which likely increased well inefficiencies and impacted the ability to analyze aquifer drawdown data. In addition, the upper perforated zone and lack of adequate development likely contributed to the well producing sediment when the flow rate exceeded 23 gallons per minute (gpm) and/or when the water level dropped below 500 feet, which corresponds to the top of the upper perforation zone. Sediment produced during normal pumping operations is detrimental to the service life of the submersible pump in the well and to the pump used to transfer water from a storage tank to the dust suppression water trucks.

1.2 STEPDRAWDOWN TESTING PROCEDURES AND RESULTS

On August 23 and 24, 2021 Tetra Tech and Hiddleston Drilling conducted a series of step-drawdown aquifer tests to estimate a sustainable pumping rate for a sustainable yield pump test. The objective was to identify the maximum pumping rate that could be used to provide a sufficient volume of water for dust suppression at the landfill without causing excessive drawdown in the well. Hiddleston Drilling measured a static water level of 322 feet below the top of casing (TOC) measuring point during the pump setup.

To determine the well's long-term sustainable pumping rate, a predictive analysis of the relationship between drawdown in the well since pumping began for several different pumping rates was compared to the amount of remaining available head in the well casing. This evaluation was based on transient conditions in the well, and included well recovery after pumping was discontinued. The data from the test was compared to the pre-test water levels to evaluate aquifer recharge and sustainability. **Figure 1** is a graph of the series of step tests conducted on August 23 and 24, 2021. The notes provide observations made during the tests. The green line in the figure represents temperature, and the water in the well is warm. At the beginning of the test the temperature was 30.1 °C (86.2 °F) and the maximum temperature observed during testing was 35.9 °C (96.6 °F), which indicates that the water supply for the well is supplied from the lower screened interval below a 1000 feet rather than the screened interval between 500 and 520 feet.

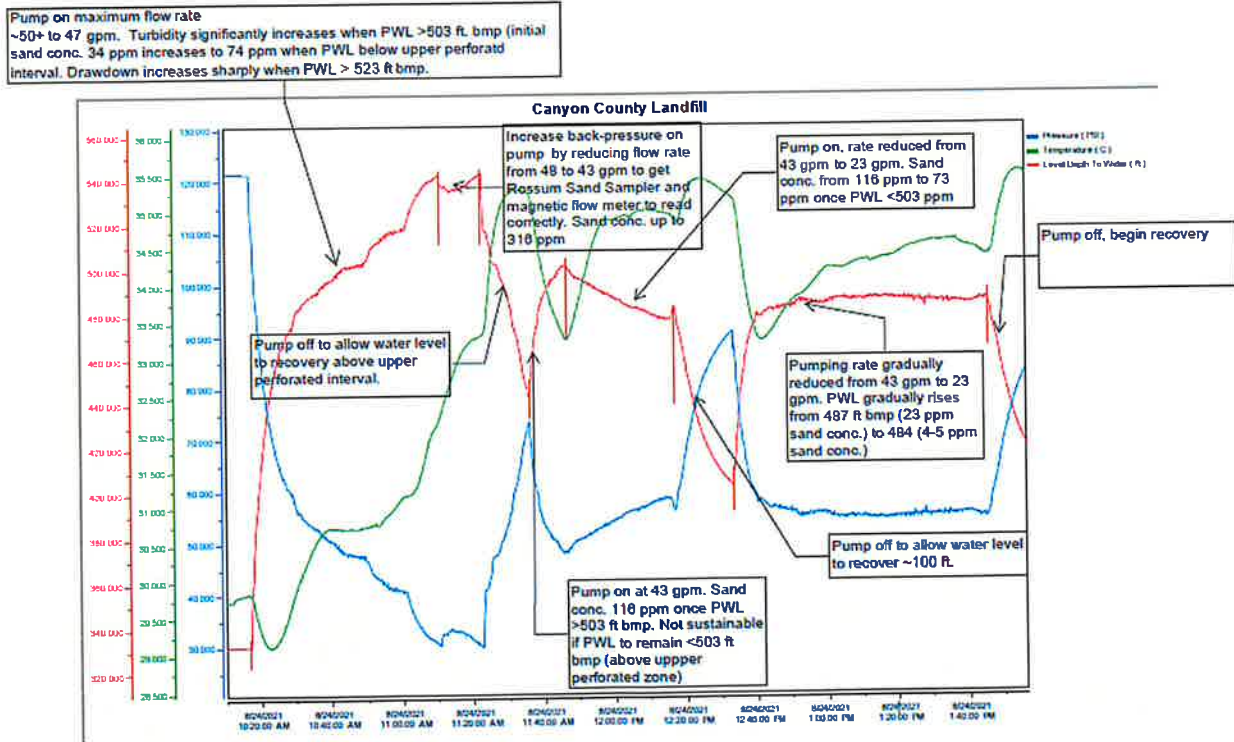


Figure 1: Step Test Results for pressure in pounds per square inch (psi) (blue), temperature in °C (green), and water level in feet (red)

Turbidity was also measured during the step-drawdown pump tests using a Rossum Sand Sampler. The tests determined that when the pumping rate was greater than 40 gpm as measured by an acoustic flow meter

provide by Hiddleston and the pumping water level (PWL) dropped into the upper perforated interval between 500 and 520 feet bgs, the sand concentrations were greater than 300 parts per million (ppm). As the pumping rate was decreased, the turbidity in the well decreased. The largest reduction in turbidity occurred when the PWL was above the upper perforated interval. At a PWL of 487 feet the turbidity was 4 to 5 ppm, which is considered acceptable. Additional testing indicated that sediment is not produced above acceptable levels when the pumping rate did not exceed 23 gpm.

The step-test also indicated that pumping rates on the order of 40 gpm produced a non-sustainable drawdown of greater than 225 feet within several hours. The pump was shut off and the water level in the well was allowed to recover for 15 hours. As shown in **Figure 2**, the water level in the well did not fully recover to pre-test water levels. The water level was 10 feet lower than pre-pumping conditions, which indicates that a pumping rate around 40 gpm would result in “mining of groundwater” from aquifer storage. This would not be sustainable for a dust suppression system. Based on the above analysis, a pumping rate of 23 gpm was selected by for the 10-hour constant discharge pump test to maximize well production and minimize sediment production and drawdown.

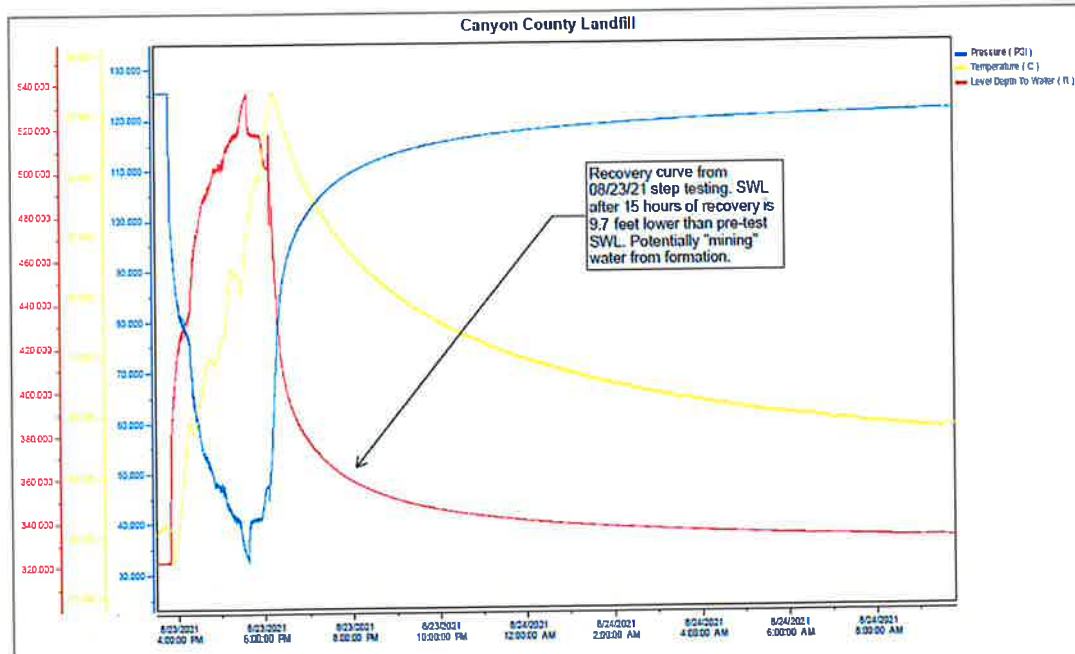


Figure 2: Step-Test Recovery Curve

1.3 CONSTANT DISCHARGE AQUIFER TESTING AND RESULTS

Tetra Tech and Hiddleston Drilling conducted a 10-hour constant discharge aquifer test on August 25, 2021. The test was initiated before the well had completely recovered from the step-testing conducted on the previous days. Well recovery was monitored for several weeks after the conclusion of the constant discharge test. Based on the step-test analysis, the pumping rate was set and maintained at 23 gpm as measured with the acoustic flow meter and verified with a bucket and stopwatch on multiple occasions throughout the test. The 23 gpm flow rate was adjusted down to 20 gpm after 10 hours (600 minutes) because the water level

continued to drawdown and was not considered sustainable for a standard work-day shift at the landfill. The pumping drawdown rebounded after the adjustment and appeared to be recovering after 120 minutes of additional pumping, which indicates that 20 gpm is a sustainable pumping rate.

The well recovery period was also monitored by the transducer and data logger to determine long-term sustainability. On October 15, 2021, the water level was 324.32 feet bgs (approximately 2.3 feet below pre-test SWL) and represent the highest level observed since testing. Recovery of the well to this level took approximately 7 weeks. **Figure 3** shows the long term recovery data and the fluctuations within the data. Although the water level is not the same as the beginning of the test, the well is considered to have recovered based on the lack of historical data to understand natural variability and seasonal variations.

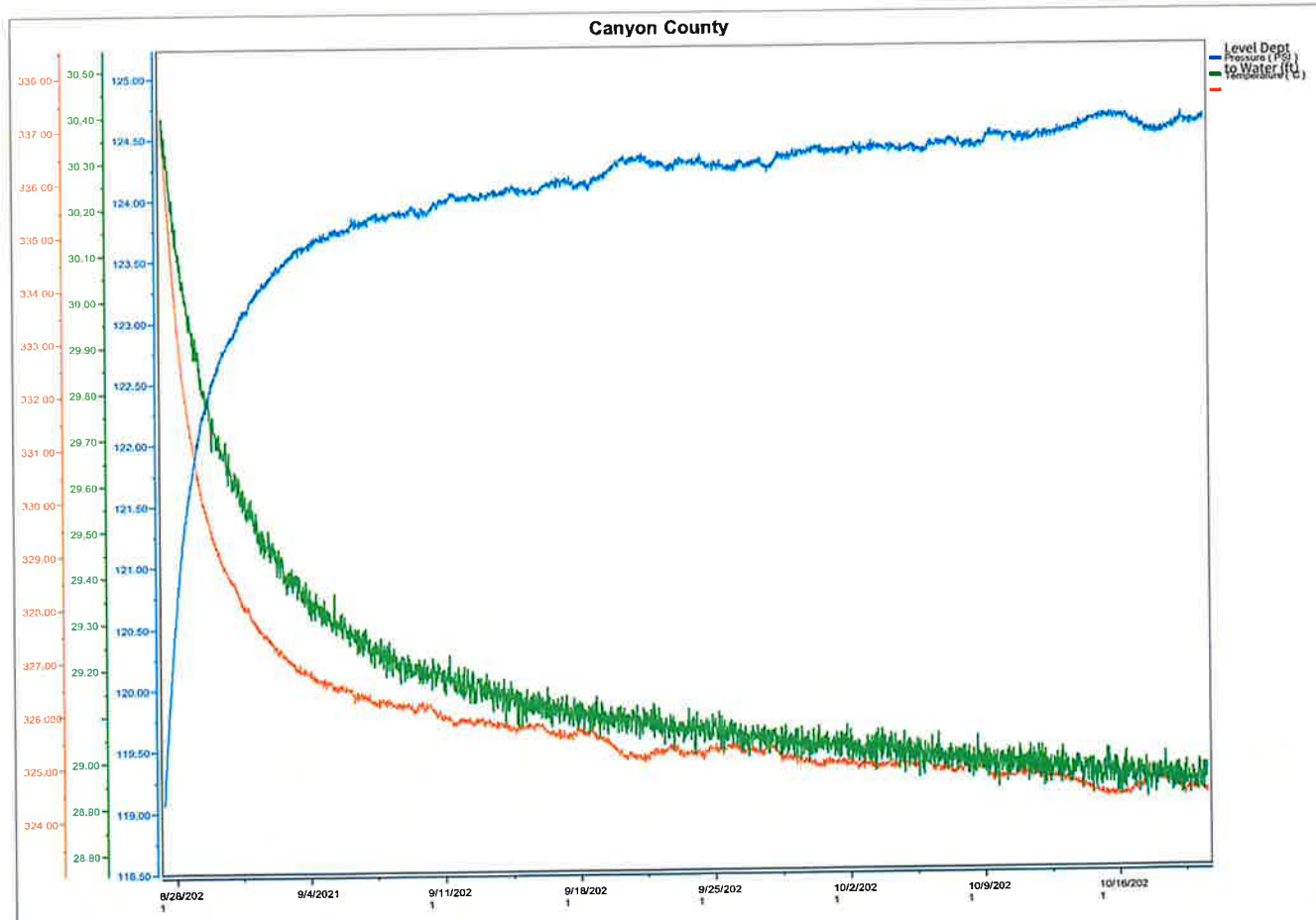


Figure 3: Constant Discharge Test Long Term Recovery Curve

Tetra Tech analyzed the time versus drawdown data during pumping and recovery using curve-matching software (Aqtesolv v4.5 Pro) to derive aquifer properties from the Analytical Solution. A copy of the aquifer test report and best fit curve match for the Hantush-Jacob method is provided as **Figure 4**.

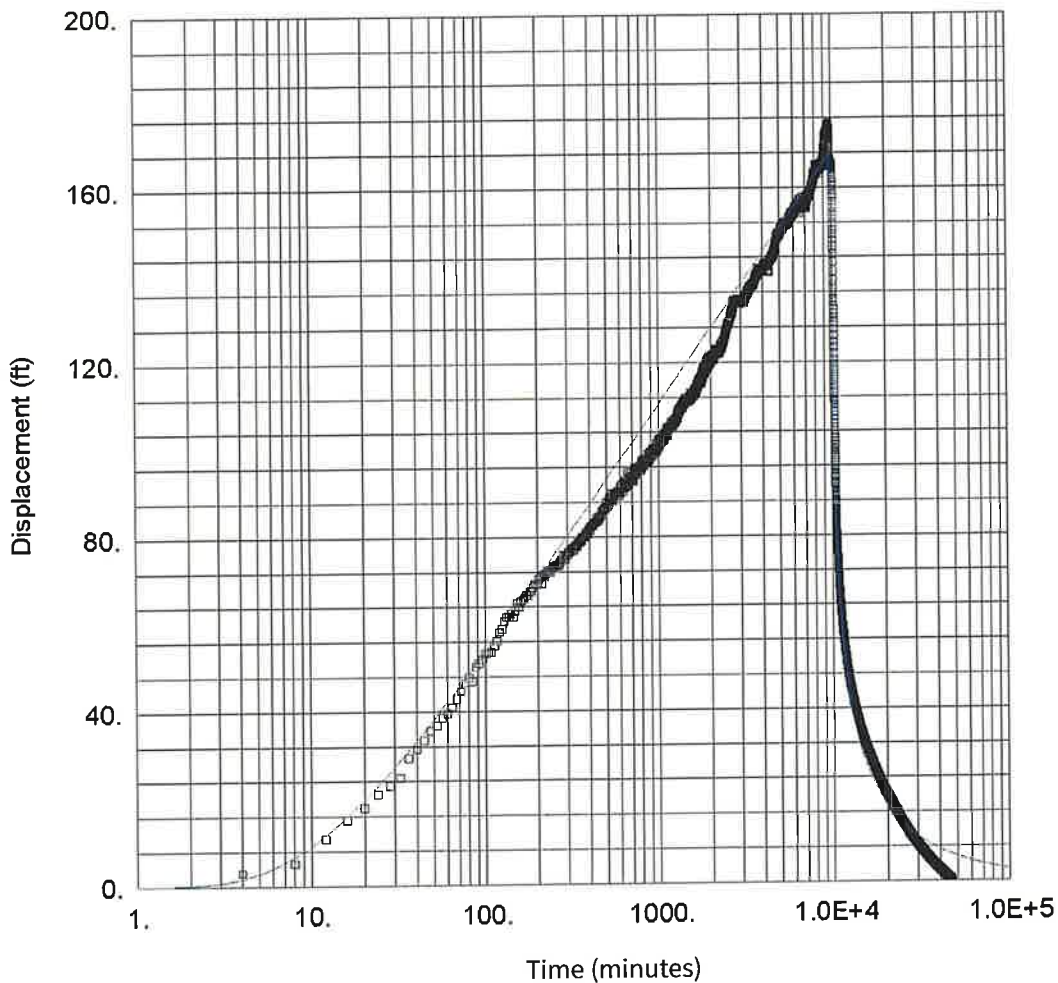


Figure 4: Comparison of Field Data (squares) versus Calculated Hantush-Jacob (line) Projection

The Hantush-Jacob analytical method assumes a leaky confined aquifer conditions, which seems to best fit the site conceptual model at the landfill. Tetra Tech assumed an aquifer thickness of 620 feet based on the well log provided. Based on this approximation, the aquifer properties were calculated and are provided in **Table 1**. The value estimated for storativity is limited because an observation well was not available for the step-test or constant discharge test.

Table 1: Aquifer Properties

Aquifer Property	Result	Units
Transmissivity	13.95	Ft ² /day
Hydraulic Conductivity	2.2 X 10 ⁻²	Ft/day
Vertical to horizontal hydraulic conductivity ratio (Kz/Kr)	0.099	Ratio (dimensionless)
r/B (leakage parameter)	1 x10 ⁻⁶	Ratio (leakage through aquitard compared to yield due to aquifer compressibility- aka storage)
Storativity*	0.28	Ratio (dimensionless)

Note: Accurate assessment of storativity/storage coefficient cannot be made using a single-well aquifer test

1.4 ESTIMATED VOLUME AVAILABLE FOR DUST CONTROL

Using the information gathered during this investigation, **Table 2** below provides a hypothetical water truck filling schedule for a typical 10-hour work day based on input from landfill operations. Tetra Tech assumed the water would be pumped from the well into a 15,000 gallon storage tank. The water truck at the landfill holds a maximum of 3,500 gallons of water and will require approximately 5 minutes to fill. A certain volume of water needs to be maintained in the tank to ensure that the pump inlet is covered, and the total capacity of the tank does not equate to the total available for dust control.

Based on testing, to prevent mining groundwater the pumping rate for the system will be 20 gpm, and the water trucks will not be filled at a frequency greater than once every 105 minutes. Once the tank for dust control has been filled and the well has recovered, the well at the landfill could supply a sufficient volume of water to fill five or six trucks per day for dust suppression purposes. Any increase in the pumping rate or increase in the frequency of filling the water trucks may cause the water level in the well to decrease into the upper perforated zone of the well. This could lead to an increase in turbidity and potentially damage the well pump and the pump used to transfer water from the storage tank to the trucks. In addition, if more than five or six trucks are filled on a regular basis (i.e. daily) the water level in the storage tank may drop below the intake of the transfer pump, and could cause excessive heating of the pump motor and premature failure.

A transducer was permanently installed in the well, and after the dust control system is constructed and operational the water level in the well should be monitored periodically to determine whether the pumping rate and/or the number of trucks filled per day should be adjusted to prevent groundwater mining.

Table 2: Hypothetical Water Truck Filling Schedule

	Elapsed Time (minutes)	Pumped for Tanker (gal)	Pumped from Well into Tank (gal)	Gallons of water Remaining in Tank
7:30 AM	0			15,000
7:35 AM	5	-3500	100	11,600
9:20 AM	110		2100	13,700
9:25 AM	115	-3500	100	10,300
11:10 AM	220		2100	12,400
11:15 AM	225	-3500	100	9,000
1:00 PM	330		2100	11,100
1:05 PM	335	-3500	100	7,700
2:50 PM	440		2100	9,800
2:55 PM	445	-3500	100	6,400
4:40 PM	550		2100	8,500
4:45 PM	555	-3500	100	5,100
7:30 AM	1440		9900	15,000

Note: Scenario Assumes Tank is Full and Aquifer Recovered

1.5 REFERENCES

Aqtesolv for Windows, (Aqtesolv), Version 4.5 Profession, 1998-2021 HydroSOLVE, Inc. All Rights Reserved, Reston, VA.

Hantush, M.S. and C.E. Jacob, 1955. Non-steady radial flow in an infinite leaky aquifer, Am. Geophys. Union Trans., vol. 36, pp. 95-100.

