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**AUBREY WATER COMPANY**

P.O. Box 85160  
Tucson, AZ 85754

July 29, 2011

Arizona Corporation Commission  
Utilities Division  
1200 West Washington  
Phoenix, Arizona 85007

Arizona Corporation Commission  
**DOCKETED**

AUG 1 2011

DOCKETED BY 

**Re: Aubrey Water Company's July 2011 Water Loss Progress Report and July 2011 Water Loss Monitoring Report**  
**Docket No. W-03476A-06-0425**

**July 2011 Water Loss Progress Report**

In regard to the above-referenced docket number, Aubrey Water Company ("Aubrey") hereby submits this Water Loss Progress Report for the period January 1, 2011 through June 30, 2011.

**1) DATA INTEGRITY**

**a) Install meter at Transfer Pump Station - COMPLETE**

The Transfer Pump Station and associated water losses have been eliminated from Aubrey's water supply system, eliminating all data integrity issues. A meter is no longer necessary or feasible and will not be installed.

**b) Verify leakage in transmission line - COMPLETE**

Leak testing of the transmission line was completed on January 5, 2011. The leak test indicated that the upper range of expected leakage in the transmission line represents 0.31% of Aubrey's annual well production and 1.8% of Aubrey's annual unaccounted for water. These low percentages indicate a very low level of leakage in the transmission line.

A Technical Memorandum dated January 31, 2011 detailing the leak testing is attached as Exhibit 2.

**c) Evaluate and modify the 8" master meter installation (transmission line) - COMPLETE**

As a part of the Town Tank and Booster Station project, Aubrey included replacement of the existing 8" master meter with a new 6" magnetic flow meter located at the Town Tank and Booster Station site.

**d) Evaluate billing procedure and equipment - PENDING**

The evaluation of billing procedure and equipment commenced on July 14, 2011 and will be completed during the 3rd quarter of 2011.

**e) Evaluate reporting procedures - PENDING**

The evaluation of reporting procedures commenced on July 14, 2011 and will be completed during the 3rd quarter of 2011.

**f) Verify meter data - PENDING**

Operating personnel have been completing verification of meter data on an ongoing basis. Aubrey is evaluating the completeness of the operational verification and will complete formal recommendations regarding this item during the 3<sup>rd</sup> quarter of 2011.

**2) APPARENT LOSSES**

**g) Water meter replacement program – ONGOING PROGRAM COMPONENT**

Aubrey replaced ten (10) water meters during the reporting period.

**h) Perform engineering evaluation and modification of the commercial standpipe meters - UNDERWAY**

Aubrey is currently evaluating the commercial standpipe meter installation to determine scope and timing of modifications. The evaluation will be complete in the 3<sup>rd</sup> quarter of 2011.

**i) Removal of out-of-service meters – ONGOING PROGRAM COMPONENT**

Aubrey removed four (4) out of service meters during the reporting period.

**j) Implement meter relocation (to the property line) program - ONGOING PROGRAM COMPONENT**

Aubrey relocated two (2) meters during the reporting period.

**3) REAL LOSSES**

**k) Replace Transfer Pump Station - COMPLETE**

Aubrey completed a project to eliminate the Transfer Pump Station (rather than replace the Transfer Pump Station) in March of 2010.

**l) Inspection of water distribution system - ONGOING PROGRAM COMPONENT**

Aubrey continues to conduct regular inspection of its water system. The inspections include the use of pipe locating equipment and observation of plant growth. During the reporting period, Aubrey identified the need for several repairs and replacements during the reporting period.

- Six (6) main line leaks were identified and repaired.
- Seven (7) main line valves were determined to be leaking and were repaired.
- Two (2) leaks were identified at meters and were repaired.

**m) Replace failing water main (approximately 1,300 feet of 4-inch steel water main)**

In accordance with Decision No. 69379 as amended by Decision No. 71284, before proceeding with replacement, Aubrey will reevaluate the need to replace the water main after completing items (a) through (l).

**July 2011 Monitoring Report**

The July 2011 Monitoring Report is attached as Exhibit 1 and contains information covering the period January 1, 2011 through June 30, 2011.

**EXHIBIT 1**



**EXHIBIT 2**

# Memorandum

## **ARICOR** Water Solutions

To: Blaine Bilderback  
From: Ray L. Jones  
Date: January 31, 2011  
Re: Aubrey Water Company  
Transmission Line Leak Test



25213 North 49<sup>th</sup> Drive  
Phoenix, AZ 85083

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### **Introduction -**

In Decision No. 71284 dated October 7, 2009, the Arizona Corporation Commission ("Commission") required Aubrey Water Company ("Aubrey") to verify leakage in its approximately 6.5 mile long water transmission line from its well field located at Canyon Mouth Reservoir to its water storage tank located near Seligman, Arizona. In December 2010, ARICOR Water Solutions ("ARICOR") was retained to conduct a leak testing of the Aubrey transmission line in accordance with the Commission directive. This memorandum presents the results of the transmission line leak testing.

### **Background -**

In 2010 Aubrey authorized two major construction projects to address water loss and aging infrastructure. The Canyon Mouth Transfer Pump Station Project consisted of modifications to Aubrey's water supply facilities located at the Canyon Mouth Reservoir. The project abandoned an existing transfer tank, transfer pump station and well pipeline, equipping the wells with new pumps capable of directly to the well transmission main. A new 6" diameter HDPE well pipeline, 2,927 feet in length, was installed from the wells to the existing 8" diameter cast iron transmission line at the transfer pump station site to allow the wells to directly pump into the transmission line. The Canyon Mouth Transfer Station Project was completed in March 2010.

The Town Tank and Booster Station Replacement Project consists of modifying Aubrey's water storage and pumping facilities located in Seligman. The project abandons the existing 250,000 gallon water storage tank and Town Booster Station located south of the BNSF Railway. These facilities are being replaced with a new 280,000 water storage tank and booster station located north of the BNSF Railway. The project includes bypassing the old tank and old booster station, converting the cast iron suction and discharge piping for the old booster station into transmission line piping and adding approximately 165' of new 6" diameter PVC transmission piping to allow filling of the new water storage tank. The Town Tank and Booster Station Replacement Project began in the fall of 2010 and is ongoing.

Ray Jones, with ARICOR, conducted a site visit on December 28, 2010 to witness startup and operational testing of the new water storage tank and booster station. The facilities were successfully tested and placed into service on December 29, 2010. During this site visit, the contractor constructing the new tank and booster station assisted with planning the leak testing and provided an overview of the transmission piping system. The contractor reported locating and repairing two leaks on the discharge piping between the old booster station and the new tank, prior to converting the piping to use as the transmission line for the New Tank.

As shown on Figure 1, the New Tank is filled using a combination of the historic transmission piping and the former Old Booster Station suction and discharge piping. At the time of leak testing, the New Tank was being filled using water from the Old Tank pumped through the Old Booster Station. This configuration was being used

because the Old Tank and Old Booster Station bypasses had not yet been installed. This configuration allowed the Old Tank and Old Booster Station to remain connected and serve as a temporary backup to the newly commissioned New Tank and booster station, as requested by Aubrey operational staff.

#### **Leak Test -**

On January 5, 2011, Ray Jones made a second site visit to conduct leak testing of the transmission line. Tim Winburne, Schweitzer Development Corp., and John Kennedy, Aubrey Water assisted with the leak testing. The tested transmission line was approximately 7.0 miles in length and is described as follows:

- Approximately 2,927 lineal feet of 6" diameter HPDE piping between the wells and the old transfer pump station site at the Canyon Mouth Reservoir
- Approximately 6.2 miles of 8" diameter cast iron piping from the old transfer pump station site to the Old Tank site.
- Approximately 1,050 lineal feet of 8" diameter cast iron piping formerly used as the suction and discharge piping of the Old Booster Station.
- Approximately 165 lineal feet of 6" diameter PVC piping extending the old discharge piping to the New Tank.

Prior to leak testing, John Kennedy filled the New Tank to overflow to allow the New Tank and booster station to be isolated from the transmission main during testing. Once the New Tank was filled, wells were shut down and the New Tank was isolated from the transmission line (at a 6" valve located between the New Meter Vault and the New Tank) for the duration of the testing.

Once the wells were shut down and the transmission line was isolated, all pumps at the Old Booster Station were turned off and a bypass was installed at the Old Booster Station. The bypass was necessary to allow water to move around the check valves at the Old Booster Station simulating hydraulic conditions once the Old Booster Station bypass is installed. The bypass consisted of a 5/8" garden hose connected from the discharge piping of the Old Booster Station to the suction piping of the Old Booster Station.

The Old Booster Station is equipped with a 3,000 gallon hydropneumatic tank. The isolation valve on the hydropneumatic tank was closed, isolating the hydropneumatic tank from the transmission piping for the duration of the leak testing.

A metered bypass was installed at the Old Meter Vault to allow metering of flow from the upper transmission line into the lower approximately 6.2 miles of 8" diameter transmission main between the Old Meter Vault and the wells at the Canyon Mouth Reservoir. The metered bypass consisted of a 5/8" diameter garden hose equipped with a 5/8" x 3/4" Sensus water meter.

A fill line was installed from the Aubrey distribution system to the New Meter Vault. The fill line consisted of a 5/8" diameter garden hose equipped with a 5/8" x 3/4" Sensus water meter.

Pressure gauges were installed at the New Meter Vault, the Old Booster Station and on the Old Tank to monitor water level and pressure in the transmission piping system.

Prior to beginning leak testing, the bypass at the Old Booster Station was opened to equalize pressure across the Old Booster Station. In addition the fill line was purged of water and a fill test was conducted to verify operation

of bypasses and interconnectivity of transmission piping. After completion of fill test the isolation valve on the Old Tank was closed, isolating the Old Tank from the transmission piping system.

At 3:19PM, leak testing of the transmission piping commenced. During the leak test, pressure in the transmission system was increased to between 40 and 60 feet of head (measured at the New Meter Vault). Water was added to the transmission system as needed to maintain pressure. Prior to and during leak testing, a detailed log of activities including pressure and meter readings was maintained to document the testing. The Leak Test Log is attached in Appendix 1.

Leak testing concluded at 5:30PM.

### **Results -**

Pressure in the transmission system was initially increased to 40' of head at the New Meter Vault (approximately 10' above maximum operational head). Pressure slowly dropped as water flowed through the Old Booster Station bypass equalizing pressure in the transmission main. After equalization, a small amount of water was added to maintain pressure in the transmission system. No flow of water was detected at the New Meter Vault.

Observations taken during the initial leak testing indicated the transmission line contained trapped air but was likely not experiencing significant water leakage.

A decision was made to increase pressure to 60 feet of head at the New Meter Vault (approximately twice the maximum operational head) to observe the reaction of the transmission system. Upon increasing the system head, flow at the Old Meter bypass was observed for the first time, indicating water flowing into the lower transmission line. After approximately 16 minutes, flow at the Old Meter Vault stopped with a total of 19 gallons flowing to the lower transmission line. Once this initial flow stabilized, no additional additions of water were needed to maintain system pressure.

Again, observations were consistent with the transmission line containing trapped air but not experiencing significant water leakage.<sup>1</sup>

Table 1 summarizes the results of the leak testing. Table 1 was prepared assuming that all metered additions of water to the transmission system during the leak test were replacing leaking water. Based on observations during the leak testing, it is likely that a significant portion of the water served to compress air trapped in the system rather than replace leakage. Accordingly the quantities shown in Table 1 represent the high range of expected actual leakage in the transmission line.

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<sup>1</sup> Although as-built elevations on the transmission main are unknown, examination of old BNSF profile sketches and GPS data indicate that the high point on the transmission line is at approximately 5,279' elevation, approximately 6.5' feet higher than transmission line discharge into the New Tank at elevation 5,272.5'. This configuration would tend to allow trapping of air in the system, consistent with the observed behavior of the transmission system during the leak testing. In addition, under static conditions, the transmission line will have a slightly negative pressure (vacuum condition) at the high point.

**Table 1 – Leak Test Results**

Line No.		Metered total flow into transmission line during leak testing	Metered flow from upper transmission line to lower transmission line
1	Total Water Usage Measured During Leak Test (gallons)	61.3	19.0
2	Total Time of Leak Test (minutes)	211	211
3	Observed Leakage Rate (gpm) [Line 1 / Line 2]	0.291	0.090
4	Equivalent Daily Leakage (gallons) [Line 3 * 1,440 min per day]	418.4	129.7
5	Equivalent Annual Leakage (gallons) [Line 4 * 365 days per yr]	152,698	47,329
6	Aubrey 2010 Unaccounted For Water (gallons)	8,461,462	8,461,462
7	Percent of Aubrey Unaccounted For Water Attributable to Transmission Line Leakage [Line 5 / Line 6]	1.8%	0.6%
8	2010 Aubrey Well Pumpage (gallons)	48,839,300	48,839,300
9	Transmission Line Water Loss Percentage [Line 5 / Line 8]	0.31%	0.10%

**Recommendations -**

The leak test indicated that the upper range of expected leakage in the transmission line represents 0.31% of Aubrey's annual well production and 1.8% of Aubrey's annual unaccounted for water. These low percentages indicate a very low level of leakage in the transmission line. Additionally, the leak test indicated the presence of trapped air in the transmission system. The presence of trapped air can cause operational issues and potentially make measurement of leakage inaccurate.

Based on the apparent low level of observed leakage and the potential for trapped air in the transmission system, the following monitoring activities are recommended for Aubrey.

1. Aubrey should permanently install a pressure gauge in the New Meter Vault to allow monitoring of pressure in the meter vault during normal operation of the transmission system.
  - a. If significant bleed down of transmission line pressure is observed at the New Meter Vault when the wells are not running, additional evaluation of the transmission line leakage and operation should be conducted.

2. Aubrey should reconcile total metered flow from the wells to total meter flow at the New Meter Vault on a monthly and annual basis.
  - a. If a significant unreconciled difference is observed, additional evaluation of the transmission line leakage and operation should be conducted.
3. Once the Old Tank and Old Booster Station bypasses are installed and made operational, Aubrey should closely observe the transmission line operation to determine the negative operational impacts, if any, of trapped air or negative pressure in the high point of the transmission line.
  - a. Should negative operating impacts be observed, consideration should be given to installing an automatic air release valve at the high point of the transmission line.

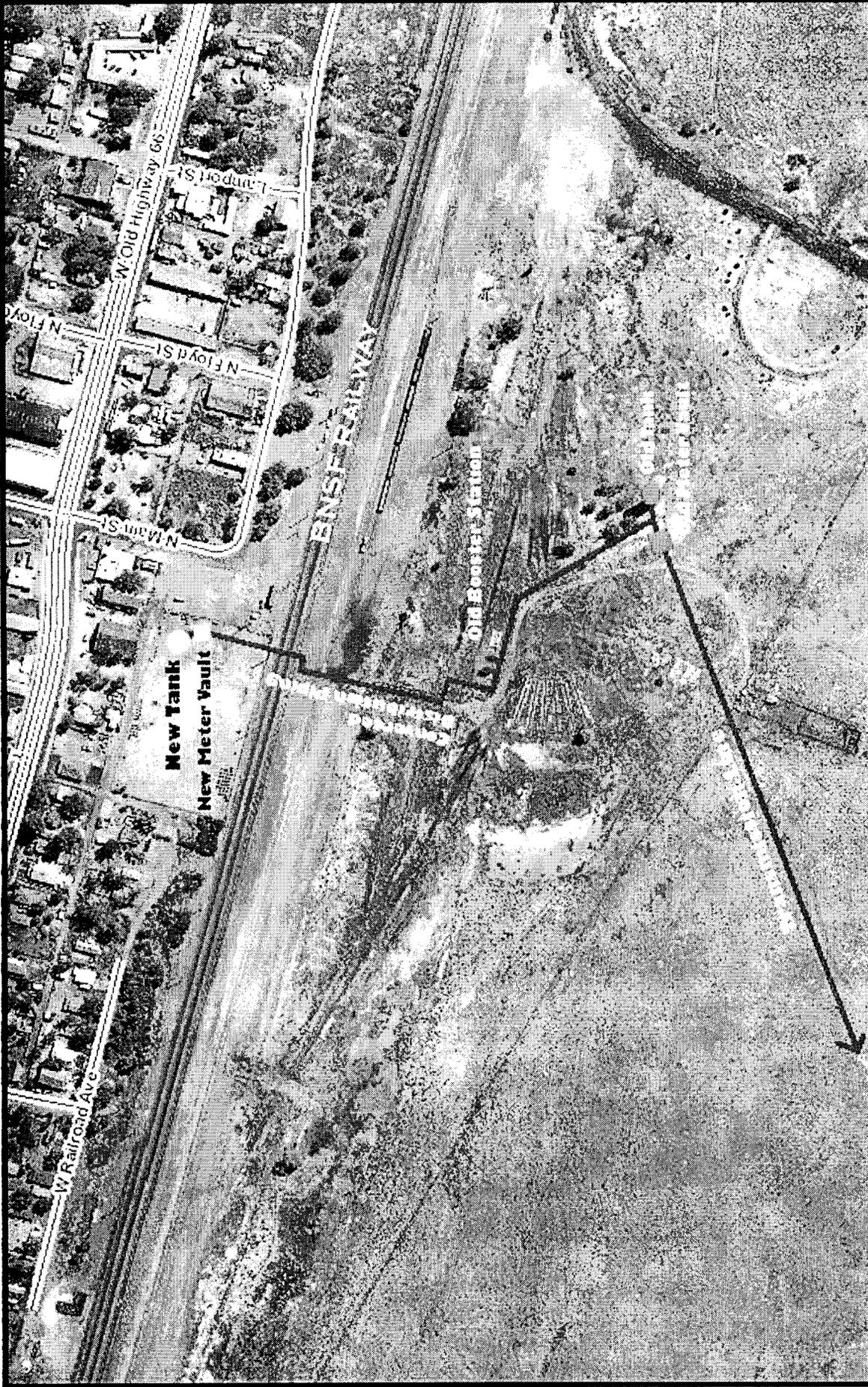


FIGURE:  
**1**

DATE:  
1-27-11

**Transmission Line Schematic**

**Aubrey Water Company**

**ARICOR**  
**Water Solutions**

## **APPENDIX 1**

**Aubrey Water Company  
Leak Test Log**

Date of Test 1/6/2011

Time	Activity	New Booster Station Bypass Meter Reading	Old Meter Vault Bypass Meter Reading	New Meter Vault Pressure Gauge 1 (psi)	New Meter Vault Pressure Gauge 2 (feet)	Old Tank Pressure Gauge (psi)	Old Pump Station Suction Side Pressure (psi)	Canyon Mouth Well Line Pressure (psi)
9:45 AM	Arrive at new Tank and Booster Station Site. Tim Winburne at site. John Kennedy called.							
9:55 AM	John Kennedy arrived on-site. New Tank at 18.2'. John Kennedy decided to fill new tank prior to beginning leak test. John turned on both wells and opened fill valve to fill both tanks.							
10:00 AM	Planning meeting in Switzer job trailer.							
10:45 AM	Travel to Old Tank and Booster Station site. New Tank at 22.9'.							
11:45 AM	Completed installation of temporary bypass at Old Booster Station. Bypass needed to allow backflow of water from pressure side of booster station around check valves to suction side of booster station.							
11:50 AM	Installed pressure gauge on Old Tank to measure tank level. Level measured at 8.5psi.					8.5		
12:00 PM	New Tank at overflow level. Wells shut down and New Tank isolated from transmission system.							
12:30 PM	Metered temporary fill line installed from New Booster Station to New Meter Vault.	785.3		76				
12:37 PM	All pumps at Old Booster Station turned off.							
12:38 PM	Old Hydropneumatic tank isolated from system. Hydropneumatic tank pressure gauge reading 62psi.							
12:39 PM	Old Booster Station bypass opened. Pressure at New Meter Vault dropping.							
12:41 PM	Pressure continuing to drop. Can hear flow in bypass at Old Pump Station.			38				
12:45 PM	Pressure continuing to drop. Can hear flow in bypass at Old Pump Station.			20				
12:47 PM	Initial Old Tank Reading taken.					7.25		
12:48 PM	Initial bypass reading at Old Meter Vault taken.		9760.0					
12:50 PM	Old Meter Vault bypass opened.							
12:52 PM	Isolation valve at Old Meter Vault closed. Bypass not registering any flow.			14				
12:55 PM	Changed to low range gauge and New Meter Vault.			13.2	30			
1:00 PM	Reading an New Meter Vault holding steady.				30			
1:07 PM	Purged temporary fill line at New Meter vault.	788.4						
1:12 PM	Conduct fill test to verify system floating on Old Tank.							
1:16 AM	Discontinue fill test.	813.8			40			
1:24 PM	Pressure at New Meter Vault slowly dropping.				33			
1:30 PM	Pressure at New Meter Vault.				30			
1:35 PM	Pressure at New Meter Vault.				29			
2:22 PM	Pressure at New Meter Vault.				27			
2:35 PM	Closed isolation valve on Old Tank		9760.1			7.4		
2:45 PM	Verified valve positions at Old Meter Vault. All okay. Pressure at bypass 7.5psi							
2:55 PM	Checked Old Booster Station bypass. All okay. Released small amount of air from system.							
3:17 PM	Add water to increase pressure.	813.8	9760.1		22			
3:19 PM	Begin Leak Test	844.8	9760.1		41			

**Aubrey Water Company**  
**Leak Test Log**

Date of Test 1/6/2011

Time	Activity	New Booster Station Bypass Meter Reading	Old Meter Vault Bypass Meter Reading	New Meter Vault Pressure Gauge 1 (psi)	New Meter Vault Pressure Gauge 2 (feet)	Old Tank Pressure Gauge (psi)	Old Pump Station Suction Side Pressure (psi)	Canyon Mouth Well Line Pressure (psi)
3:25 PM	Awaiting Pressure Stabilization				36			
3:30 PM	Awaiting Pressure Stabilization				31.5			
3:45 PM	Pressure equalized across Old Booster Station Bypass.				29		10	
3:36 PM	Added water to system.				40			
3:47 PM	Pressure readings taken.				38		10.5	
3:49 AM	Added water to system. Can hear water flowing through bypass at Old Booster Station.				60		14	
3:51 PM	Pressure reading taken.				51.5		16	
3:52 PM	Adding water to maintain 60' head at New Meter Vault. Old Booster Station bypass working but with delayed reaction due to small diameter bypass.				60		18	
4:00 PM	Continuing to maintain approximately 60' head at New Meter Vault. Flow observed at Old Meter Bypass for first time. 1/4 to 1/3 gpm.							
4:05 PM	Flow at Old Meter Vault has stopped.		9779.0					
4:07 PM	Pressure holding at New Meter Vault. Stopped adding water to maintain pressure.				63.5			
4:10 PM	Pressure readings.						26	
4:12 PM	Pressure slowly dropping.				62			
4:20 PM	Pressure holding at New Meter Vault. Departed for Canyon Mouth wells.				62			
4:49 PM	At Canyon Mouth.				60			78
5:02 PM	Meter Reading		9779.0					
5:03 PM	Beginning discharging water at Canyon Mouth from hose bibb on well line.							
5:06 PM	End discharging water at Canyon Mouth. Estimate 10 gallons discharged.		9779.2		60			78
5:30 PM	Final Readings	906.1	9779.1		56			