Internal Monitoring Report

Policy # O-2E Sustainability **Date:** August 23, 2016
Frequency: Twice a year

I certify that the following information is true.

Policy Language:

Madison residents will benefit from a sustainably managed ground water supply to ensure that water is available to protect public health, and to maintain and improve the economy and environment in Madison, now and in the future.

Accordingly,

1. Aquifers and wells will be monitored and the data evaluated to identify trends in water levels and potential contaminants.
2. Appropriate city, county, state and federal agencies will be called upon to enforce all pollution control and prevention measures within their authority, in order to protect water quality in the well head protection area of each unit well.
3. The adopted Conservation Plan shall be monitored and evaluated regarding progress to fulfill the goal of a 20% reduction per capita residential use of water by 2020, which equates to 58 gallons/capita/day. (Residential is defined as single family and duplex dwellings.)
4. The water supply system shall be expanded so that the pumpage from individual unit wells shall not exceed 50% of the annual rated capacity of the unit well.
5. Water rates will complement economic growth in Madison (as stated in 0-2D).

General Manager's interpretation and its justification:

This policy prescribes certain activities intended to ensure the long term environmental, public health, and economic sustainability of Madison's water supply. Our actions relating to these objectives are detailed below.

Data directly addressing the General Manager's interpretation:

1. Aquifers and wells will be monitored and the data evaluated to identify trends in water levels and potential contaminants.

Water Levels

The water levels in the aquifers beneath Madison continue to be monitored on a routine basis. A deep groundwater monitoring well located in the basement of the State Capitol has provided water levels since 1946. A review of the data indicates levels continue to vary on a seasonal basis, a direct result of demand (pumping) and recharge (precipitation.) As in past years, winter water levels were approximately 11 to 13 feet higher than those experienced during the summer months. Overall, water levels continue to rise, with an increase approximately 13 – 14 feet over the last 10 years. This is a good indication that the aquifers are in the process of rebounding/recovering to former pre-pumping levels. The water levels beneath the central

part of our city during the last 30 years are displayed in Figure 1.

The static and pumping water levels in many of the Utility's wells varied slightly during the first half of 2016. Variations, however, were significantly less than those experienced during past years (i.e., 2012) when we were subject to extremely hot and dry summer conditions. Water levels in the Utility's wells continue to fluctuate seasonally and are greatly influenced by precipitation events. A review of the recent water level data indicates that, with the exception of several wells, most of the water levels are dropping as the summer demands are increasing. The decrease in levels is consistent with those of last year and the levels in all of the wells appear to be sustainable for the near future. Average static and pumping water levels between June 2011 and June 2016 are depicted in Table 1.

Madison Kipp Corporation/UW #8 Sentinel Well

The Madison Kipp Corporation (MKC) continues to run its groundwater extraction and treatment system at its Waubesa Street site. The remedial system is being utilized to remove volatile organic compound (VOC) mass and hydraulically contain VOC contaminated groundwater present in the upper bedrock aquifer beneath the site.

The pumped groundwater is still being treated using an air stripper located on-site. The treated water (~40 - 45 gpm) is discharged to the storm sewer under a WPDES Discharge Permit. The most recent compliance samples were below WPDES discharge limits. The recovery operation began in early July of 2015 and is expected to operate for a number of years.

The Utility continues to work with MKC, their consultant ARCADIS, the WDNR, and the WGNHS on the area's groundwater contamination issues. In December of 2015, the Utility hired Eric Oelkers and SCS Engineers to continue the hydrogeological review initiated by Jessica Meyer.

Eric and SCS are about half done with this study and provided some preliminary results to the Water Quality Technical Advisory Committee on July 12th, 2016. Work to date includes:

- Reviewed and expanded the tetrachloroethylene (PCE) contaminant trend analysis, originally performed by Arcadis in early 2014, using additional groundwater data collected since then. There are currently a total of 61 permanent monitoring points including about 42 individual or nested wells and four multilevel wells associated with the MKC site. The expanded trend analysis showed eight monitoring points with **increasing** PCE concentrations; however, these sample locations are either on the source property (Kipp) or **north** and **west** of the source property. The shallower monitoring well (MW-25D) of the pair of wells located between Unit Well 8 and the Kipp site did not show an increasing trend, and no PCE has been detected in the deeper well (MW-25D2).

- Prepared a cross section to summarize PCE data in relation to geophysical data collected during the Kipp investigation. They determined that: bedrock groundwater monitoring points are generally biased toward fractures; there are few apparent fracture zones in boreholes that are not intersected by permanent sampling points; and there are no

monitoring points in the Mount Simon aquifer which is providing water to Unit Well 8. More monitoring points are needed.

- Completed initial model runs using the 2016 Groundwater Flow Model for Dane County developed by the Wisconsin Geological and Natural History Survey and the USGS. The initial simulations suggest that the primary horizontal flow pathway from the Kipp site to UW 8 is through the Mount Simon Aquifer. The horizontal travel time estimated by the model in the deep aquifer is on the order of 50 to 60 years. The model run, however, does not appear to accurately reproduce the vertical flow component of flow from the water table into the deeper bedrock aquifers. As a result, it is difficult to estimate the likely travel time along a complete flow path from the Kipp site to UW 8. The model does indicate that (contaminated) water recharged at the surface at the Kipp site will likely be drawn into UW 8 under anticipated pumping conditions at some point in the distant future. Additional modeling is necessary.

- SCS will evaluate additional groundwater monitoring data produced by the Kipp investigation as it becomes available. The Kipp data will be further analyzed to evaluate the breakdown of the PCE and other contaminants which may indicate the location of the leading edge of contaminant migration in the aquifers below the site. They will perform additional simulations with the Dane County groundwater flow model to see if a more realistic travel time estimate is possible and to evaluate locations for potential **sentinel well(s)** between the identified Kipp groundwater plume and UW 8. Given the initial results from the groundwater model analysis, it appears that a new sentinel well in the Mount Simon aquifer may provide the best early warning for potential contaminant migration from Kipp to UW 8. At this point SCS does not plan to reproduce or refine the CRAFLUSH fate and transport modeling performed by Kipp's consultants.

Groundwater at and adjacent to the facility continues to be monitored routinely for VOCs. The most recent groundwater sampling, conducted in 2016, indicates that PCE levels in the groundwater between the site source and UW 8 remain relatively constant. The southeastern extent of the plume appears stable with the edge approximately 600 horizontal feet from UW 8. The installation of a sentinel well, originally proposed to be installed adjacent to Elmside Circle Park, remains on hold.

<u>UW 29 Sentinel Well</u>

Water from the sentinel well located between UW 29 and the Sycamore Landfill continues to be monitored for both inorganic and volatile organic compounds on a semi-annual basis. Sampling is conducted in April and October of each year with twelve samplings conducted to date. Results from the latest April 2016 sampling revealed some minor VOC detects.

- Trichlorofluoromethane was detected in the shallowest port at a level of 0.40 ug/l. This detect is below the level of quantification (0.91 ug/l) and there is no MCL for this compound. Trichlorofluoromethane exists in the water table aquifer at low concentrations throughout the area and is not related to the landfill.

- Toluene, which can be attributed to the coating on the well liner, was detected at

concentrations between 0.23 – 0.47 ug/l in Ports 1, 2, 3, and 4. The MCL for toluene is 1000 ug/l. There have been no detects of toluene in an adjacent groundwater observation well located 25 feet away.

- No VOCs were detected in water from UW 29.

There were no significant concentrations of inorganic constituents detected this round.

Sampling indicates that the migration of contaminants from the Sycamore landfill is not a significant threat to water quality at Unit Well 29 at this time.

UW 31 - Zone 4 Production Well

The production well at the Tradewinds Parkway site was drilled and completed during the winter of 2014. The well is currently capped and awaiting the construction of a well house with filter and an adjacent reservoir. The 1.5 million gallon reservoir has been constructed and is scheduled to be painted. Design plans for the well house, filter, and pumping equipment are almost complete. The project is to be bid in late 2016, constructed in 2017, and brought on-line in 2018.

In terms of well head protection, the zoning overlay for Wellhead Protection District No. 31 was incorporated into the Madison General Ordinances [MGO 28.102] last fall.

The WDNR continues to monitor the groundwater monitoring and remedial activities associated with the GE Health care site. There are no new updates to report for this site.

To date, no TCE or any other volatile organic compounds have been detected at the Tradewinds Parkway well. The Tradewinds Parkway site is located over 6000 feet from the source of the TCE contamination.

UW 6 & 9 - VOC Investigation

MWU recently hired an environmental consultant to investigate sources of VOC contamination, namely tetrachloroethene (PCE), at two wells – Well 6 (University Avenue) and Well 9 (Spaanem Avenue). Two ERP sites were identified in the investigation as possible sources of the contamination. Results were submitted to the WDNR in order to initiate discussions in expediting the remediation of the ERP sites with the goal of mitigating impacts to the wells. There has been no action as of yet.

UW 15 – VOC Source

The WDNR recently requested that a groundwater investigation be performed at the former Day One Formal Wear site. This property, with an address of 3939 Lien Road, is located approximately 800 feet to the southeast of UW 15. Results from a groundwater monitoring well recently installed at the Lien Road property revealed PCE in the groundwater there. The WDNR has requested the installation of additional groundwater monitoring wells and several rounds of groundwater sampling. It appears that the contaminants are deeper than expected so the proposed monitoring wells will be screened at deeper intervals than the original wells.

The site is thought to have used dry cleaning solvents in the 1980s. It was originally identified as a possible contaminant source for the PCE in UW 15. Low levels of PCE vapors were detected in soil gas probes at the site in a 2012 study. However, shallow groundwater samples collected did not identify any VOCs at that time. MWU is awaiting the sampling results requested by the WDNR.

2. *Appropriate city, county, state and federal agencies will be called upon to enforce all pollution control and prevention measures within their authority…*

As previously mentioned, the Utility continues to work with the Mayor's office and the WDNR in monitoring the remediation of the PCE contaminated groundwater at the Madison Kipp site. At the request of the WDNR, the Madison Water Utility, City Engineering, and Public Health continue to review the remedial strategies and plans proposed by MKC and their consultants. The Utility continues to remind the WDNR of the City's plans to upgrade UW #8 with an iron and manganese filter. Once upgraded, UW 8 would be pumped throughout the year at a much higher volume. A meeting with the WDNR to discuss local groundwater investigative options has been proposed and will likely occur after Eric Oelkers completes his review.

3. The adopted Conservation Plan shall be monitored and evaluated regarding progress to fulfill the goal of a 20% reduction per capita residential use of water by 2020…

MWU pumped a total of 4,843,731,000 gallons of water to the distribution system during the first half of 2016. This is approximately 1%less than the 4,888,214,000 gallons pumped last year.

Average Day: 26,614,000 gpd (last year 27,007,000 gpd)
Max Day: 35,500,000 gpd on June 22 (last year 31,094,000 gpd on June 11)
Min Day: 19,810,000 on January 2 (last year 20,840,000 gpd on February 2)

Residential consumption in gallons per capita by year:

1980-2000	81.5
2002-2007	71.8
2008	69.8
2009	67.8
2010	65.0
2011	65.2
2012	70.3
2013	61.0
2014	62.2
2015	60.9
2016	Pending
Goal: 2020	***58.0***

4. The water supply system shall be expanded so that the pumpage from individual unit wells shall not exceed 50% of the annual rated capacity of the unit well.

Our service level for capacity planning is 50% utilization, and system expansion is being

planned to accomplish this level. The Utility continues to propose and build additional booster stations and new well facilities to help achieve this goal. In addition, variable speed drives (VFDs) are being added to existing motors/pumps each year to optimize system flows.

Overall, utilization rates during the first half of 2016 were very similar to those experienced in 2015. Through June 30th 2016, seven different wells exceeded the 50% utilization rate. Well repair/reconstruction projects and the necessary use of seasonal wells on a year round basis continue to significantly influence individual well rates.

- UW 19 has been out of service for repairs during much of 2016 and has been utilized at only 4.8% of its capacity. This is one of the wells that is regularly above the 50% utilization rate. To compensate, UW 6 (a seasonal well) was in service the entire winter and has increased its rate to almost 50%.
- UW 28 (another seasonal well) was on-line all winter because of problems at UW 16 and UW 26. As a result, its utilization rate was twice what it normally is. The well problems have been fixed and the rate at UW 28 should return to normal.
- MWU continued to lower the utilization rates at one of its most heavily pumped wells (UW 20) by utilizing BS 106 more.
- Unfortunately, the 50% goal was significantly exceeded again at UW 14 (79.9%). The use of this site is not likely to lesson without the addition of a Zone 8/Zone 6W booster station.

The addition of VFDs on the deep wells at several of the sites has allowed the Utility to directly minimize the utilization rates of these wells. Plans call for the installation of a VFD on the deep well at UW 30 this fall. In addition to saving a significant amount of electricity, the installation should help with managing the well's utilization rate. Indirectly, VFDs on booster pumps have also allowed us to minimize deep well pumping at other sites. MWU is in the process of installing VFDs on the booster pumps at UW 16 and UW 17. Actual utilization rates for 2015 and 2016 are shown in Tables 2 and 3.

Current construction projects which will affect utilization rates:

- The construction of a Zone 6E reservoir at site 113 will significantly reduce the utilization rate of UW 13. This project is nearing completion.
- The reconstruction of UW 12, making it a two zone well, will reduce utilization rates in the far west pressure zones (UW 12, UW 20, and UW 26). This project has been rescheduled for 2017.
- The connection of Zone 11 to Zone 10 will help reduce the utilization rate of UW 26/Tower 126. Additional pipeline/main improvements are scheduled for later this summer.

<u>Energy Conservation Assessment</u>

UW Engineering Grad student, Connor Mancosky, is spending the summer looking at pump efficiency and VFD optimization. Connor continues to evaluate, refine, and develop our understanding of the benefits of variable frequency drives on our deep wells and booster

pumps. He is working to itemize design and operating criteria that will minimize energy demand and justify investment in a VFD.

Connor has confirmed UW 30 as a good candidate for the addition of a variable speed drive on the well pump as a pilot project. Data will be collected before and after the installation of a VFD to verify and refine design criteria for energy conservation resulting from the addition of a VFD at UW 30.

Connor is starting the energy analysis of Pressure Zones 8, 10, and 11. These three zones are fed by Wells 16, 26, and 28 in addition to BS 128. This far west area is isolated from the system allowing analysis of energy consumption, pump efficiency, and operating characteristics as a total water supply system. His study will look at developing operational criteria that will determine the best electrical efficiency for the water system in this area.

Objectives of this energy conservation research project include: 1) identify pumping design criteria that will optimize energy conservation, 2) identify projects with the highest potential for energy reduction; 3) evaluate and recommend energy conservation projects to the Utility, and 4) implement a pilot study to verify calculations and assumptions.

5. Water rates will complement economic growth in Madison (as stated in O-2D).

Please refer to the Monitoring report for the Affordability Outcomes Policy (O2-D).

I report compliance.

Attachments:
Aquifer Water Levels Graph
Unit Well Water Levels Table
Unit Well Capacity Tables

Figure 1: Aquifer Water Levels - State Capitol Well

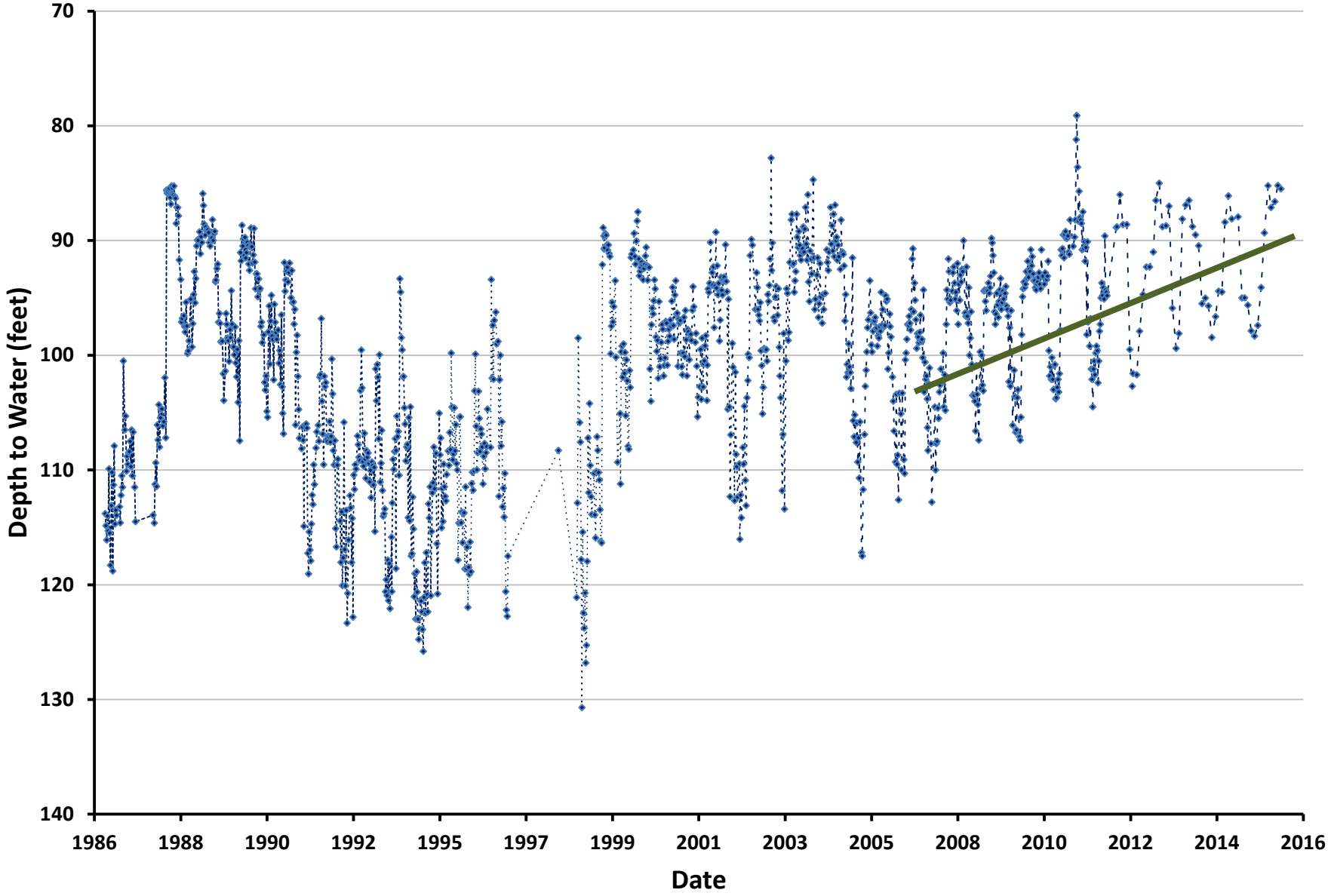

Table 1: Average Water Levels - Wells (Feet to Water)

	6		7		8		9		11		12		13		14		15		16		17	
Date	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping
Jul-11		179.6	57.7	142.7	66.6	149.9	110.8	183.0	35.5	149.6	177.7	266.3	31.6	176.1	26.9	54.5	58.3	141.2	183.8	281.2	50.7	120.8
Aug-11		178.9	57.2	136.6	55.6	154.0	111.7	183.6	39.8	149.9	179.5	268.1	29.9	171.4	26.9	54.5	60.7	141.7	183.3	279.8	49.5	119.3
Sep-11	79.3	179.9	53.8	129.3			109.1	181.4	37.2	151.2	173.0	263.1	25.2	161.2	27.0	54.3	64.8	140.8	178.3	276.0	48.5	118.6
Oct-11	86.2	179.7	53.1	126.0			107.8	180.5	32.7	145.7	169.9	261.0	23.6	159.2	26.7	54.4	66.4	140.0	174.3	273.8	46.7	116.8
Nov-11			55.3	123.4			107.5	180.1	41.2	147.4	168.1	259.1	21.3	156.2	26.5	53.8	71.5	141.0	173.2	274.7	46.6	116.8
Dec-11			53.8	113.3			106.7	179.8	45.0	150.8	165.5	257.0	22.4	156.4	26.8	53.9	78.3	141.0	173.4	273.9	46.3	116.6
Jan-12			68.0	124.8			105.3	178.1	47.3	151.9	169.6	258.4	23.9	124.2	27.1	53.9	74.4	140.0	175.2	275.0		
Feb-12			51.3	119.6			106.5	179.3	33.6	174.6	168.3	257.6	17.5	115.5	27.4	54.1	84.5	140.2	177.4	276.8		
Mar-12			53.4	106.9			106.4	179.3	46.4	150.9	166.3	257.9	17.6	116.0	27.3	53.9	67.2	139.0	176.2	275.7		
Apr-12	97.8	178.1	51.8	102.8			106.8	179.7	41.8	151.1	163.5	255.2	18.0	113.2	26.9	53.6	64.3	138.4	175.0	274.4		
May-12	75.2	182.1	50.9	134.3			108.5	181.0	41.0	152.8	170.7	261.2	18.3	113.2	26.8	53.6	67.8	140.1	176.0	276.3		
Jun-12	70.0	185.8	56.1	174.9			113.5	184.8	44.0	154.5	183.4	272.2	20.1	114.4	27.7	54.3	70.4	141.9	186.3	284.8	48.9	122.0
Jul-12	116.2	192.6	63.1	185.4		159.7	122.9	189.7	46.2	155.9	190.1	281.9	20.8	114.6	29.2	55.3	82.4	144.5	199.7	294.4	58.4	126.5
Aug-12	116.7	184.1	55.1	179.2	61.3	146.1	117.0	185.3	43.6	154.7	183.1	271.0	20.3	113.2	28.4	54.4	62.7	141.1	186.7	285.2	52.9	122.2
Sep-12	128.4	190.7	59.7	176.4			116.3	184.4	41.5	154.0	186.6	269.8	20.6	113.6	25.9	53.0	63.3	140.7	186.6	284.7	52.8	120.8
Oct-12	142.1	187.2	53.4	174.7			112.1	181.4	38.6	153.6	173.2	261.6	19.8	112.8	27.2	53.8	61.7	140.5	182.2	281.3	46.9	116.3
Nov-12	142.2	188.4	51.8	169.4			109.3	178.9	42.2	153.1	165.0	252.7	19.2	111.7	27.8	53.7	60.1	141.4	177.0	276.3	43.0	113.5
Dec-12	145.0	187.9	53.4	174.8			108.4	178.0	41.3	152.9	162.7	251.1	19.5	110.6	28.5	54.0			174.5	274.3	45.7	116.1
Jan-13	78.2	185.1	54.3	174.7			108.7	178.3	45.8	153.2	163.4	253.4	20.0	110.3	28.9	54.0	50.4	123.4	174.5	274.3	45.6	115.4
Feb-13	86.1	185.9	55.7	163.9			107.5	177.7	36.7	152.6	166.4	256.5	18.9	109.1	28.8	54.0	70.2	139.9	175.8	275.4		
Mar-13	49.2	186.4	61.9	144.8			106.9	177.2	38.9	152.3	164.5	254.7	19.3	108.7	28.9	53.9	60.7	138.7	175.4	274.9		
Apr-13	48.8	186.5	64.1	161.3			105.6	176.5	37.3	150.1	166.3	255.8	17.7	108.6	28.7	53.6	59.1	137.3	175.8	274.8		
May-13	74.5	182.4	74.1	169.7			107.0	177.7	37.5	150.5	169.9	259.2	16.8	103.8	34.7	53.8	67.0		177.5	276.3		
Jun-13	96.0	187.3	87.1	172.3			108.0	178.0	35.7	148.9	171.0	260.4	16.4	101.7	39.0	55.3	63.3	111.4	179.2	277.5		
Jul-13	66.2	189.7	119.5	178.3		175.8	109.9	179.7	37.1	149.5	175.5	262.8	23.4	120.3	28.1	53.4	79.7	116.4	181.2	281.1	51.3	128.1
Aug-13	55.1	191.0	66.9	164.1			113.3	181.4	39.3	151.7	180.7	265.7	15.9	105.4	28.5	53.6	67.4	108.8	184.9	285.1	48.7	120.0
Sep-13	51.9	191.5	83.4	161.4			112.0	180.0	41.7	150.8	183.1	267.8	16.6	105.9	28.6	53.7	66.3	106.8	184.9	283.2	51.2	120.9
Oct-13	53.8	187.8	109.5	160.3			108.3	178.2	39.8	149.9	171.3	260.8	16.7	105.5	27.9	53.2	63.6	104.8	176.8	276.0	47.2	118.2
Nov-13	61.8	188.8	122.6	167.9			105.9	175.9	36.1	148.8	170.5	258.8	56.8	145.3	27.9	53.9	52.9	102.9	174.9	274.9		
Dec-13	81.5	187.2	126.1	163.4			106.2	176.3	37.5	149.7	167.2	257.2	60.9	148.3	28.2	53.1	55.8	100.3	174.1	273.3		
Jan-14	86.0	186.7	129.7	162.4			108.3	178.0	41.8	150.8	167.4	257.5	62.1	150.4	28.3	53.0	43.4	86.9	174.1	272.6		
Feb-14	85.5	189.4	139.2	168.7			112.4	181.4	45.8	152.4	171.3	260.6	68.0	153.7	28.7	53.3	44.4	80.8	176.2	275.3		
Mar-14	68.6	186.9	141.9	171.1			109.6	178.7	38.3	151.1	174.5	262.3	72.6	157.4	29.0	53.4	57.8	85.9	179.5	277.4		
Apr-14	51.9	188.6	145.2	178.2			107.1	177.4	40.7	150.2	175.1	261.4	71.1	157.1	28.5	53.0	50.0	96.9	177.2	275.2	46.4	119.5
May-14	50.8	187.1	135.8	181.1			107.8	177.6	40.8	150.3	174.8	263.2	17.1	98.3	28.5	52.9	54.1	88.5	178.5	276.1	44.9	115.5
Jun-14	52.7	189.1	134.1	170.7			110.1	180.0	46.4	152.8	174.1	263.9	16.9	98.0	28.6	53.0	50.4	93.6	180.3	277.7	48.5	119.0
Jul-14	52.7	189.5			77.5		108.6	178.7	44.2	152.1	171.4	266.2	15.4	96.6	28.5	54.5	56.2	98.8	186.1	280.3	45.7	116.9
Aug-14	55.3	191.7			67.8	149.0	107.9	178.6	42.5	152.2	177.6	269.2	15.7	96.5	28.9	55.6	56.0	109.4	194.6	278.3	49.8	119.5
Sep-14	53.7	191.6			77.5		107.1	176.9	38.5	151.2	175.5	264.5	15.7	96.4	28.7	52.7	53.3	90.3	174.9	276.5	48.2	117.1
Oct-14	56.7	190.2			76.6		105.1	175.6	41.4	150.4	177.0	263.2	15.8	96.3	28.1	55.4	57.9	85.9	178.1	266.5	45.8	115.0
Nov-14							106.2	175.7	35.7	149.8	169.6	262.1	15.4	96.3	27.9	54.5	51.9	84.7	170.7	264.5	46.2	117.4
Dec-14							103.5	174.9	36.1	149.7	169.4	262.2	15.8	96.9	28.4	52.9	52.5	84.8	171.4	266.8		
Jan-15							102.8	175.1	37.6	150.2	167.0	261.3	16.4	97.0	28.5	53.6	52.2	85.5	172.9	269.0		
Feb-15							103.3	175.6	37.6	151.1	176.9	263.6	17.1	97.6	28.7	55.9	52.4	85.6	171.4	271.3		
Mar-15							103.3	176.1	39.5	151.2	178.0	265.0	17.4	97.9	28.9	53.5	52.3	85.9	175.2	270.6		
Apr-15	30.0	156.7	61.0	110.0			104.5	175.9	39.0	150.8	176.6	265.2	16.8	97.5	28.6	55.3	53.1	85.7	176.6	270.4	50.0	120.0
May-15	32.0	154.9	49.0	130.0			106.3	177.5	37.4	150.9	182.4	264.7	15.3	96.9	28.5	53.2	53.6	86.1	176.6	271.2	44.9	117.7
Jun-15	29.0	154.9	64.0	128.0	77.7		107.1	179.4	36.4	151.2	172.1	257.8	16.6	97.4	28.5	52.2	53.9	95.3	175.6	271.2	46.1	117.9
Jul-15	30.0	156.4	63.8	128.6	73.8	145.6	109.9	180.5	37.4	150.8	184.8	262.8	16.6	96.3	28.8	52.2	57.8	98.2			48.5	119.8
Aug-15	29.7	155.8	52.7	127.0	78.9	145.5	109.9	180.7	36.5	150.1	170.7	270.2	17.3	96.2	29.3	52.4	58.2	98.5			50.6	119.8
Sep-15	29.6	157.5	55.5	130.4	79.8	152.9	111.5	179.9	37.3	151.3		270.1	17.3	97.0	29.0	51.3	49.0	96.7			51.1	120.9
Oct-15	31.2	154.3	53.4	130.3			102.4	176.5	35.6	149.8	181.3	265.7	16.5	97.3	28.5	51.7	51.7	96.7				
Nov-15	29.1	153.7	50.7	122.3			105.4	175.5	35.3	149.2	171.1	264.3	16.2	96.0	28.2	50.1	47.8	94.6				
Dec-15	30.8	154.3	65.9	125.4			104.6	174.2	33.6	149.4	178.8	262.4	15.5	95.7	28.1	52.6	46.6	91.1	173.1	268.9		
Jan-16	29.1	153.1	45.7	119.8			104.2	174.2	33.1	148.6	194.1	263.9	15.6	96.2	28.0	49.6	50.9	85.1	176.1	271.1		
Feb-16	31.5	155.0	47.3	121.9			104.6	174.5	34.0	148.3	190.2	265.2	15.7	96.2	31.8	49.9	48.7	86.5	177.0	272.2		
Mar-16	33.0	155.5	46.1	120.1			104.3	173.9	33.6	149.0	180.5	263.9	15.5	95.9	28.1	49.3	48.8	87.8	177.7	270.6		
Apr-16	32.3	155.2	46.0	121.7			103.8	174.0	33.5	148.7	188.8	264.4	14.7	95.4	27.8	49.0	52.2	93.3	178.8	270.8		
May-16	32.5	156.5	50.1	123.5			104.9	175.4	34.5	148.1	183.0	263.1	14.7	95.6	27.8	48.9	52.7	106.3	177.2	270.8	50.5	117.4
Jun-16	33.5	156.2	53.8	133.3		155.8	108.7	178.2	36.7	149.4	169.6	264.8	15.2	95.5	28.0	48.7	51.3	105.8	183.7	272.9	44.8	116.1

Table 1 Cont.: Average Water Levels - Wells (Feet to Water)

	18		19		20		23		24		25		26		27		28		29		30	
Date	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping	Static	Pumping
Jul-11	106.6	311.2	62.7	208.0	274.8	389.9	54.5	113.6	60.0	249.8	118.2	289.2	343.5	412.7	66.0	217.9	158.2	282.4	156.0	163.0	127.4	274.0
Aug-11	105.5	311.2	59.3	200.9	280.3	391.8	57.2	114.0	60.0	248.8	117.6	288.9	344.3	412.8	76.8	216.6	154.1	280.1	155.8	163.0	128.0	273.9
Sep-11	108.2	311.2	56.7	201.4	274.6	387.7	52.6	112.5	60.0	248.0	113.0	284.1	335.9	408.3		216.9	153.1	277.3	148.3	156.8	123.8	272.1
Oct-11	97.8	308.9	56.4	199.9	270.9	384.4	56.7	113.7	60.0	246.9	110.2	245.1	336.8	403.4			143.9		143.8	152.5	122.5	272.2
Nov-11	97.0	309.4	55.6	200.3	267.2	381.6		159.7	60.1	247.1	109.0	243.8	334.9	399.0			141.7	268.2	121.3	151.2	121.0	269.6
Dec-11	97.0	310.7	58.4	201.2	264.1	378.3		159.7	60.0	244.5	118.7	259.9	326.4				154.7	275.3	115.1	148.7	121.1	269.4
Jan-12	97.0	310.7	61.9	202.6	259.8	378.0		159.7	60.7	243.5	118.5	253.3					151.0	274.6			121.7	268.9
Feb-12	98.2	312.4	66.9	205.8	260.5	381.0	58.4	121.5	62.6	246.3	116.6	254.4					150.0	274.6			124.2	270.8
Mar-12	102.6	311.6	67.7	206.3	262.6	379.0	51.0	111.1	60.0	248.1	106.4	236.3					149.1	274.0			124.3	271.2
Apr-12	100.7	310.6	54.9	200.4	262.5	378.1	51.7	111.1	60.7	248.8	106.6	237.4	323.8	380.7			147.8	275.1	103.4	148.8	125.4	272.4
May-12	100.2	312.6	53.8	202.2	270.0	383.2	52.0	112.2	60.9	252.5	110.8	238.8	334.8	406.3	34.2	214.3	148.7	276.5	129.0	176.4	127.3	273.6
Jun-12	104.7	317.8	61.2	206.3	282.7	390.6	53.2	114.7	63.8	256.2	120.8	257.0	342.1	417.0	65.4	217.3	160.1	284.4	147.3	183.4	145.9	290.1
Jul-12	107.4	319.3	68.8	211.4	292.3	392.4	62.2	117.3	63.1	258.2	133.6	268.8	369.6	427.5	68.0	222.1	170.2	292.2	151.9	186.9	156.7	299.4
Aug-12	100.8	316.0	63.0	206.5	287.7	394.3	55.9	114.2	64.5	254.6	129.4	249.6	362.9	418.3	64.9	219.4	159.8	283.2	147.0	182.5	146.2	290.9
Sep-12	103.9	316.3	68.2	210.5	291.3	399.0	53.3	113.3	67.8	256.0	127.2	248.7	352.5	416.5	55.1	223.8	160.7	284.4	148.6	182.5	146.5	290.0
Oct-12	100.3	314.4	63.6	210.4	284.4	394.2	55.3	150.2			125.3	248.7	344.3	410.1	49.3	214.6	154.6	281.9	148.1	181.5	140.8	285.9
Nov-12	97.6	311.9	57.1	201.7	276.7	388.7			60.0		122.6	246.7	338.5	404.3					145.0	178.4	133.0	280.0
Dec-12	97.5	309.8	54.7	201.9	276.7	388.5			60.8	231.6	123.5	247.5	338.5	403.2					144.5	177.9	129.3	277.2
Jan-13	97.9	312.1	55.6	201.8	277.7	389.5			61.1	227.9	125.2	245.0	338.1	403.5					146.8	178.7	127.5	276.2
Feb-13	99.4	312.5	58.3	203.7	279.1	390.4			60.4	233.1	125.8	244.7	338.3	404.9					149.1	181.4	129.5	278.1
Mar-13	98.2	311.7	58.7	203.2	279.4	390.2			60.3	229.6	109.6	247.6	338.3	404.4					147.9	180.1	126.8	276.7
Apr-13	101.8	311.8	58.8	204.7	275.8	387.9	45.2	108.6	60.5	228.0	108.0	244.4	335.6	402.9	66.6	213.9			145.2	177.4	128.9	277.5
May-13	105.0	313.8	58.5	204.8	278.8	390.5	47.4	110.6	60.3	229.3	113.3	258.9	337.7	405.1	61.2	211.6	146.2	272.0	143.2	176.1	130.4	278.4
Jun-13	97.1	309.8	58.1	204.6	267.6	390.0	48.9	109.5	60.8	229.2	116.5	258.8	336.1	404.5	55.4	211.1	152.6	273.4	144.7	177.7	137.0	285.1
Jul-13	103.7	313.7	57.9	203.4	284.4	394.3	47.8	110.5	63.3	232.6	116.1	259.8	341.9	408.6	83.2	212.7	150.8	272.4	146.9	180.1	137.1	284.1
Aug-13	101.5	316.3	61.1	204.9	287.1	397.1	50.1	111.5	65.0	233.7	119.3	258.6	349.7	410.8	136.8	213.5	153.1	273.4	149.8	182.6	138.3	285.4
Sep-13	98.0	315.3	60.1	202.4	281.0	398.6	53.7	112.0	63.5	234.4	117.6	255.9	347.3	412.1	155.0	213.6	121.3	278.5	118.8	164.7	141.0	288.6
Oct-13	97.0	313.1	55.0	198.5	279.6	393.6	50.9	111.0	62.5	229.2	110.8	253.6	342.7	406.5	141.8	218.5	126.5	279.5			134.3	283.8
Nov-13	97.0	310.9	54.7	198.3	276.4	392.8	48.4	109.9	61.2	225.8	110.3	252.6	337.8	403.7	101.3	217.9					132.0	282.2
Dec-13	97.0	310.5	52.8	194.7	279.8	393.7	48.9	110.1	60.2	224.5	106.6	253.5	337.5	404.1	133.6	206.8				179.3	132.6	282.5
Jan-14	97.0	311.1	52.5	194.4	276.3	394.3	51.1	111.6	60.2	224.7	107.6	254.1	339.5	405.1	161.2	214.3			140.2	176.7	132.3	282.1
Feb-14	97.0	312.6	56.6	195.7	282.5	395.4	50.4	111.5	60.2	226.3	111.1	255.0	340.3	405.8	165.2	227.9			122.5	177.2	138.4	287.4
Mar-14	97.0	311.9	56.5	194.8	283.4	396.8	49.6	110.8	60.0	225.4	113.0	254.4	344.1	407.4	51.2	213.2				178.6	138.8	286.9
Apr-14	97.0	312.7	58.1	193.9	279.3	395.5	47.2	109.6	60.6	229.1	111.3	254.1	343.5	406.6	49.3	210.4	143.1	270.1	127.2	177.2	137.0	286.1
May-14	97.0	313.1	54.8	192.0	282.3	396.0	47.9	109.7	61.2	226.2	115.3	254.4	343.6	407.1	49.1	209.5	148.6	277.1	115.8	177.5	136.6	284.9
Jun-14	99.2	314.3	58.1	192.7	282.6	396.5	49.1	109.7	63.4	230.4	115.3	255.7	339.0	406.8	47.7	210.2	156.9	285.3	126.3	180.2	143.0	290.7
Jul-14	94.4	314.6	62.4	197.5	284.8	397.9	46.6	105.0	61.5	228.5	110.3	255.8	335.7	408.0	46.4	209.5	159.9	286.5	127.4	180.2	141.5	289.8
Aug-14	93.9	315.4	60.7	190.9	263.3	399.3			67.9	230.7	111.6	257.3	322.4	411.8	51.0	211.3	162.4	288.7	140.3	181.5	146.3	293.4
Sep-14	92.6	313.4	58.4	189.1	275.9	395.2			67.7	228.3	107.4	255.3	326.0	405.4	51.5	211.1	152.6	284.1	145.6	178.8	142.7	290.3
Oct-14	97.0	312.3	62.5	185.6	279.5	393.1			66.6	228.1	111.7	257.5	337.2	403.9	55.7	209.2	151.2	289.9	146.4	177.8	140.5	287.9
Nov-14	97.7	312.0	58.5	186.3	271.8	394.7			62.1	225.4	102.3	255.6	337.0	404.8	52.5	210.0	146.1		144.6	177.4	138.0	289.0
Dec-14	96.4	311.3	61.3	190.7	280.1	395.5			61.4	223.8	104.3	254.3	333.9	403.5	58.7	209.6	143.8		144.1	177.1	144.6	293.5
Jan-15	94.3	310.3	65.6	191.6	272.8	395.5			60.4	222.8	99.4	254.7	333.0	402.2	58.1	207.9	145.7		131.2	175.6	146.1	292.5
Feb-15	92.7	311.8	72.0	194.2	279.2	395.1			61.4	225.4	105.7	255.0	335.2	402.8	64.9	210.1	146.1		130.6	179.0	141.8	290.9
Mar-15	97.0	312.0	71.3	192.7	276.3	397.7			60.0	225.6	105.0	255.1	325.2	405.9	92.0	212.3	146.8			179.7	130.3	287.8
Apr-15	100.3	311.0	70.5	188.9	280.6	397.6			60.4	227.9	105.8	254.6	314.9	404.6	77.8	210.1	147.1		131.5	179.5	138.7	287.7
May-15	95.8	310.5	62.2	182.1	282.9	399.2	48.9	117.5	60.0	227.3	107.9	254.6	338.2	406.1	71.1	208.3	151.3	281.3		179.8	139.3	288.5
Jun-15	96.4	310.9	63.4	177.7	282.0	401.3	55.5	119.5	60.0	218.4	109.5	255.2	341.4	407.8	72.7	208.0	158.2	288.1		180.8	139.5	288.4
Jul-15	99.9	311.1	62.7	176.2	277.1	400.7	53.6	118.8	57.2	205.4	110.0	253.2	332.3	409.1	85.3	209.9	165.3	291.5	133.2	181.7	140.4	289.3
Aug-15	96.6	313.0	61.8	172.8	266.4	401.6	54.6	119.7	55.3	209.2	104.2	254.6	349.6	413.1	88.9	212.4	167.6	296.6		182.9	146.6	294.1
Sep-15	97.1	312.3	60.6	170.6	261.4	398.7	52.8	119.0	57.3	207.8	107.0	255.9	347.0	411.4	105.1	211.2	170.3	294.1		181.8	142.3	290.9
Oct-15	91.7	311.2	60.5	165.1	270.6	397.6			57.0	202.8	106.9	254.4	342.0	407.8	145.2	209.8	157.9	287.6		180.3	135.8	287.6
Nov-15	95.2	310.9			269.0	395.8			49.1	201.9	109.7	253.2	328.3	405.9	135.0	209.7	155.0	285.8	127.2	179.0	136.8	286.5
Dec-15	94.6	310.0			274.7	394.8			57.5	198.8	99.9	250.9	328.2	405.8	97.0	207.6	150.1	286.1	133.0	177.5	135.6	285.8
Jan-16	98.5	310.6			275.4	395.2	46.4		39.0	198.5	112.1	251.0	337.6	405.3	97.1	206.7	148.1	280.6	116.7	177.3	134.5	284.8
Feb-16	97.8	310.3			275.9	395.8	46.6		38.3	199.8	113.4	249.2	341.9	405.9	116.9	207.4	149.1	282.1		177.9	135.3	285.6
Mar-16	97.1	309.2			275.0	394.6	46.0		38.5	199.8	110.7	248.8	336.1	407.4	138.4	207.6	150.9	283.4	106.8	176.7	135.7	286.0
Apr-16	98.0	310.9			275.3	394.7	45.3		40.7	201.5	113.9	249.1	349.1	404.6	94.9	209.4	150.9	284.3		178.1	137.9	287.8
May-16	97.2	311.5			279.0	398.1	45.6	124.0	44.5	205.6	116.5	246.2	341.5	406.4	83.2	208.0	150.4	283.1	108.4	178.4	134.6	287.1
Jun-16	97.9	312.1			279.2	398.4	45.6	120.5	43.7	205.6		250.9	334.8	404.3	76.2	209.3	154.3	286.2	122.4	177.6	134.0	286.2

Table 2: 2015 Unit Well Capacity

Start Date: January 01, 2015 **End Date: December 31, 2015**

Unit Well	DW Capacity GPM	Total Daily Capacity MGD	Total Capacity To Date Mil Gal	Actual Pumpage To Date Mil Gal	% DW Utilization		DW Run Hours To Date	DW Rest Hours To Date	% DW At Rest To Date	% DW Running To Date
6	2,823	4.1	1,483.9	313.4	21.1%		2,154.2	6,605.8	75.4%	24.6%
7 *	2,200	3.2	1,156.3	192.9	16.7%		2,204.8	6,555.2	74.8%	25.2%
8	1,992	2.9	1,047.2	17.5	1.7%		143.8	8,616.2	98.4%	1.6%
9	1,746	2.5	917.4	445.1	48.5%		4,271.7	4,488.3	51.2%	48.8%
11	2,105	3.0	1,106.3	448.5	40.5%		3,556.1	5,203.9	59.4%	40.6%
12	2,413	3.5	1,268.1	796.7	62.8%		5,358.4	3,401.6	38.8%	61.2%
13	2,592	3.7	1,362.6	849.7	62.4%		5,616.2	3,143.8	35.9%	64.1%
14	2,008	2.9	1,055.2	843.7	80.0%		7,010.6	1,749.4	20.0%	80.0%
15 *	2,200	3.2	1,156.3	388.6	33.6%		5,641.2	3,118.8	35.6%	64.4%
16	2,311	3.3	1,214.5	242.4	20.0%		1,749.3	7,010.7	80.0%	20.0%
17	2,328	3.4	1,223.7	308.4	25.2%		2,205.9	6,554.1	74.8%	25.2%
18	1,868	2.7	981.7	357.6	36.4%		3,192.2	5,567.8	63.6%	36.4%
19	1,724	2.5	906.4	463.0	51.1%		4,499.7	4,260.3	48.6%	51.4%
20	2,023	2.9	1,063.3	575.7	54.1%		4,716.1	4,043.9	46.2%	53.8%
23	1,259	1.8	661.8	58.8	8.9%		798.8	7,961.2	90.9%	9.1%
24	2,001	2.9	1,051.6	473.0	45.0%		3,851.2	4,908.8	56.0%	44.0%
25 *	2,000	2.9	1,051.2	414.3	39.4%		4,549.2	4,210.8	48.1%	51.9%
26	2,029	2.9	1,066.6	771.9	72.4%		6,347.6	2,412.4	27.5%	72.5%
27	2,085	3.0	1,095.9	317.8	29.0%		2,560.7	6,199.3	70.8%	29.2%
28	2,327	3.4	1,223.1	346.6	28.3%		2,558.1	6,201.9	70.8%	29.2%
29 *	2,200	3.2	1,156.3	660.3	57.1%		8,671.8	88.2	1.0%	99.0%
30	2,407	3.5	1,265.1	682.8	54.0%		4,824.9	3,935.1	44.9%	55.1%

* Denotes wells with variable frequency drives (VFDs)

Table 3: 2016 Unit Well Capacity

Start Date: January 01, 2016 **End Date:** June 30, 2016

Unit Well	DW Capacity GPM	Total Daily Capacity MGD	Total Capacity To Date Mil Gal	Actual Pumpage To Date Mil Gal	% DW Utilization		DW Run Hours To Date	DW Rest Hours To Date	% DW At Rest To Date	% DW Running To Date
6	2,840	4.1	744.3	369.7	49.7%		2,438.7	1,929.3	44.2%	55.8%
7 *	2,200	3.2	576.6	114.0	19.8%		1,229.2	3,138.8	71.9%	28.1%
8	1,980	2.9	518.9	0.0	0.0%		0.0	4,368.0	100.0%	0.0%
9	1,755	2.5	460.0	218.1	47.4%		2,091.5	2,276.5	52.1%	47.9%
11	2,090	3.0	547.7	170.3	31.1%		1,332.7	3,035.3	69.5%	30.5%
12	2,430	3.5	636.9	400.7	62.9%		2,752.8	1,615.2	37.0%	63.0%
13	2,625	3.8	688.0	436.8	63.5%		2,838.0	1,530.0	35.0%	65.0%
14	2,000	2.9	524.2	418.7	79.9%		3,638.6	729.4	16.7%	83.3%
15 *	2,200	3.2	576.6	197.6	34.3%		2,621.6	1,746.4	40.0%	60.0%
16	2,300	3.3	602.8	260.2	43.2%		1,808.7	2,559.3	58.6%	41.4%
17	2,290	3.3	600.2	79.6	13.3%		540.0	3,828.0	87.6%	12.4%
18	1,810	2.6	474.4	185.1	39.0%		1,496.8	2,871.2	65.7%	34.3%
19	1,700	2.4	445.5	21.2	4.8%		177.5	4,190.5	95.9%	4.1%
20	2,025	2.9	530.6	274.8	51.8%		2,264.7	2,103.3	48.2%	51.8%
23	1,310	1.9	343.3	12.8	3.7%		170.8	4,197.2	96.1%	3.9%
24	2,000	2.9	524.2	242.2	46.2%		1,964.0	2,404.0	55.0%	45.0%
25 *	2,000	2.9	524.2	204.5	39.0%		2,362.9	2,005.1	45.9%	54.1%
26	2,045	2.9	536.0	330.2	61.6%		2,681.3	1,686.7	38.6%	61.4%
27	2,100	3.0	550.4	129.3	23.5%		1,022.5	3,345.5	76.6%	23.4%
28	2,380	3.4	623.7	105.8	17.0%		768.0	3,600.0	82.4%	17.6%
29 *	2,200	3.2	576.6	338.5	58.7%		4,250.8	117.2	2.7%	97.3%
30	2,410	3.5	631.6	333.5	52.8%		2,320.9	2,047.1	46.9%	53.1%

* Denotes wells with variable frequency drives (VFDs)