Internal Monitoring Report

Policy # O-2E Sustainability **Date:** July 22, 2015
Frequency: Twice a year

I certify that the following information is true.

Signed_____, General Manager

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, summer levels were approximately 10 to 12 feet lower than those experienced during the

winter. Overall, levels appear to be increasing or rebounding with an increase of approximately 12 – 13 feet since 2005. 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 2014 and the first half of 2015. 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 have recovered from their summer lows and appear sustainable. Average static and pumping water levels for 2011 – 2015 are depicted in Table 1.

Madison Kipp Corporation/UW #8 Sentinel Well

The Madison Kipp Corporation (MKC) continues to implement a series of remedial measures at their site to clean up the immediate area's contaminated groundwater. MKC recently completed an on-site groundwater extraction system consisting of a 12 inch diameter well screened from 60 to 175 feet below the surface. The screened interval covers the area of highest VOC concentrations and intersects the aquifer's primary fracture intervals. It is expected that the recovery well will remove volatile organic compound (VOC) mass and hydraulically contain VOC contaminated groundwater present in the upper bedrock aquifer.

The pumped groundwater is being treated using an air stripper located in a newly constructed building located on-site. The treated water (~40 - 45 gpm) is discharged to the storm sewer under a WPDES Discharge Permit. The recovery operation began in early July of this year 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. The Utility recently hired Eric Oelkers, a hydrogeologist and environmental consultant, to continue the hydrogeological review begun by Jessica Meyer.

Earlier this year, Jessica finished her evaluation of the stability of the contaminant plume and the fate and transport modeling of PCE in the bedrock below and adjacent to the MKC site. Jessica provided a summary of her findings, a list of short comings and a set of recommendations including:

- Install additional monitoring wells between the edge of the PCE plume and UW #8 both vertically and horizontally (3D coverage.)
- Refine the site's hydrogeologic unit conceptual Model with additional characterization
- Re-evaluate and re-analyze both site specific and groundwater concentration data
- Delineate the capture zones for UW #8 and the extraction well in 3D under different pumping scenarios
- Seal a former test hole located adjacent to the production well at UW #8
- Revise and rerun the Craflush Model

Eric has been asked to take the review to the next level with some additional hydrogeological

evaluation and a work plan identifying necessary steps to insure that increased pumping at UW #8 will not be impacted by the contaminant plume. His study is expected to be complete in early December of 2015. The results are important as the Utility is proposing to invest in a filter at UW #8.

Groundwater at and adjacent to the facility continues to be monitored routinely for VOCs. The installation of the sentinel well, proposed to be installed adjacent to Elmside Circle Park, remains on hold. Part of the next step is determining if the sentinel well(s) is still needed and where it (they) might be located.

UW #29 Sentinel Well

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 2015 sampling revealed some minor VOC detects.

- Chlorobenzene was detected in Port 1 (water table surface) and Port 4 (300′ depth) at a concentration of 0.16 ug/l. Both detects were below the level of quantification (0.53 ug/l) and well below the MCL of 100 ug/l. The coating on the well liner is thought to be the source of this compound.

- Trichlorofluoromethane was also detected in the shallowest port at a level of 0.35 ug/l (no MCL). This compound exists in the water table aquifer throughout the area and is not related to the landfill.

- Toluene, which can also be attributed to the coating on the well liner, was detected at concentrations between 0.24 – 0.95 ug/l in all six of the ports. The MCL for toluene is 1000 ug/l.

- No VOCs were detected in water from UW #29.

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.

The WGNHS is in the process of running the Dane County groundwater flow model for the area surrounding UW #29 and the adjacent Sycamore Landfill. The model is being run utilizing a series of different pumping rates at UW #29. It is hoped that these runs will determine if an increase in pumping at UW #29 will have an influence on the groundwater contaminants emanating from the Sycamore Landfill. An additional set of filters could be added at the unit well if the results suggest there is no impact.

UW #31 - Zone 4 Production Well

The production well at the Tradewinds Parkway site was drilled and completed during the winter of 2014. The bore hole was dynamited to increase the specific capacity and then the lower 40 feet filled with a cement grout to lesson any possible radium impacts. The well is currently capped and awaiting the construction of a well house with filter and an adjacent

reservoir. The reservoir will be built later in 2015 and the well house hopefully in 2016.

GE Healthcare continues to sample, on a quarterly basis, the monitoring well located on Water Utility property at 5802 Femrite Drive. Trichloroethylene (TCE) is consistently found at the 10 to 15 ug/L level – two to three times the enforcement standard for groundwater quality. No TCE or any other volatile organic compounds were detected at the recently completed production well located at the Tradewinds Parkway site. The Tradewinds Parkway site is located about a mile southwest of the Femrite monitoring well and over 6000 feet from the source of the TCE contamination.

<u>UW #24 – Adjacent Groundwater Contamination</u>

Low levels of vinyl chloride were recently detected in the shallow groundwater beneath a property (710 E. Mifflin St.) located adjacent to the UW #24 site. The property, which is located across Livingston Street immediately to the west of the reservoir/booster station, is owned by the Reynolds Company and is used for the storage of crane equipment. A groundwater investigation originally detected vinyl chloride in several on-site water table observation wells (0.94 and 42 ug/l) and in the deeper groundwater immediately adjacent to the site (0.45 ug/l and 0.58 ug/l.)

Groundwater flow direction at the site is to the north east, in the direction of UW #24. As a precaution, two additional monitoring wells were installed in late October to further delineate the edge of the plume. One of the wells, a shallow piezometer, was located in the Livingston Street ROW in front of the booster station/reservoir building. Water samples were taken and no VOCs were detected.

The WDNR reviewed the site investigation results and granted Conditional Closure to the site on April 23, 2015. The monitoring wells were abandoned and the site was added to WDNR Remediation and Redevelopment Program's GIS Registry. The owner of the property will be responsible for maintaining a cap or cover on the property and limiting groundwater infiltration.

It appears that the shallow contaminants occurring nearby will have no impact on the water produced at UW #24. The well is cased to a depth of 235' and extends through the Eau Claire shale layer.

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 recently contacted the WDNR and reminded them 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…

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
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, 2014 and 2015 to date utilization rates were slightly higher than those experienced in 2013. Well repair/reconstruction projects and the necessary use of seasonal wells on a year round basis continue to significantly influence individual well rates. The Utility did manage to lower the utilization rates at two of its most heavily pumped wells (UW 20 and UW 26.) Unfortunately, the 50% goal was significantly exceeded again at UW 14. 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 (UW 7, UW 15 and UW 25) has allowed the Utility to directly minimize the utilization rates of these wells. Indirectly, VFDs on booster pumps (i.e., UW 7, UW 11, and 28) have also allowed us to minimize deep well pumping at other sites. Actual utilization rates for 2014 and 2015 are shown in Tables 2 and 3.

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.

Other sustainability initiatives:

Energy Conservation Assessment

UW Engineering Grad student, Matt Hayes, completed his thesis and presented his work to the Board in June. Matt made the following recommendations.

- Do not install VFD's on high capacity wells in that the energy saving does not justify the cost.
- Install VFD's on low and medium capacity wells for energy savings.
- Select well pumps with VFD use in mind to gain the best energy efficiency.
- Projected savings of over 100,000 kwh per year may be available per well with VFD addition

A new grad student, Connor Mancosky, has started this summer and will be continuing work on developing energy conservation projects for the Utility. Objectives of Connor's energy conservation research are being developed but may include:

- Review of energy use of existing VFD installations
- Optimization of operation of VFD's on both well pumps and booster pumps throughout the system.
- Identifying areas to be more fully evaluated as a part of an overall Utility energy conservation program.
- Evaluate and recommend energy conservation projects to the Utility.

Attachments:

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

Figure 1: Aquifer Water Levels - State Capitol Well

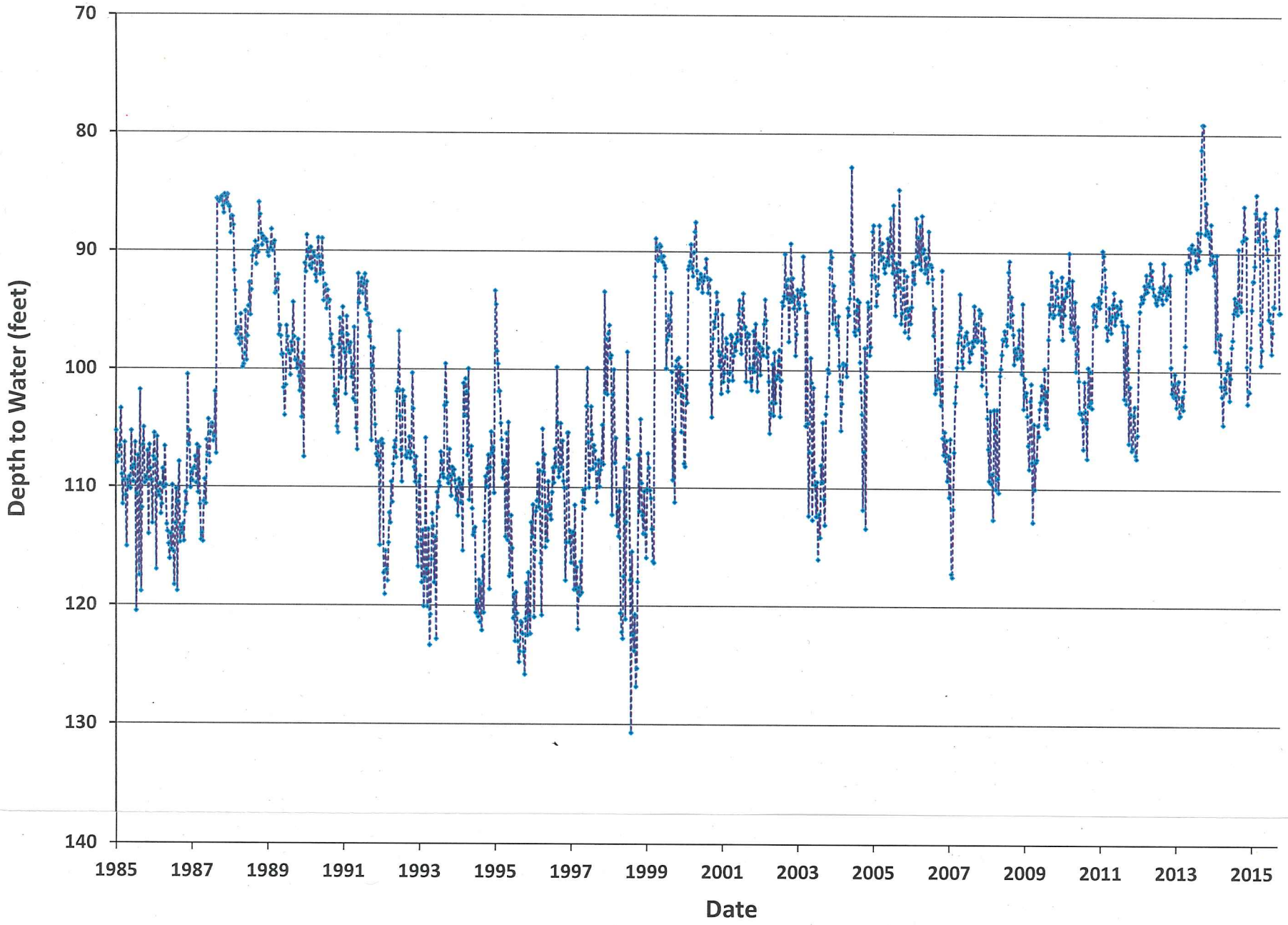

Table 1: Average Water Levels - Wells (Feet to Water)

	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
Jan-11			60.9	169.8			103.4	177.3	27.0	145.6	161.2	252.1	30.2	174.9	26.9	54.4	75.1	142.9	175.9	273.7		
Feb-11			53.5	158.3			104.3	178.0	28.8	146.7	161.8	253.5	30.3	175.6	27.1	54.5	75.6	143.2	173.9	271.7		
Mar-11			51.4	155.9			103.8	177.3	31.5	146.7	169.5	259.2	30.3	175.4	26.9	54.3	66.7	141.6	176.1	272.2		
Apr-11	115.6	167.1	55.7	156.5			102.8	176.7	26.3	145.8	168.3	258.5	26.9	174.5	26.6	54.0	70.7	142.0	171.7	267.7		
May-11	92.6	175.4	53.3	149.6			105.1	178.8	27.1	146.7	171.7	259.4	29.6	175.2	26.4	53.9	67.7	141.7	173.5	271.2	44.8	121.5
Jun-11	79.7	176.7	58.4	148.6	47.0	156.9	108.2	181.5	29.5	147.9	177.5	262.7	27.9	173.4	26.6	54.1	78.7	141.0	176.7	274.8	44.6	118.6
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	175.0	257.8	16.6	97.4	28.5	52.2	53.9	95.3	175.6	271.2	46.1	117.9

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
Jan-11	97.4	301.6	61.9	199.7	255.7			159.5	60.0	247.2	106.6	278.1	350.6	452.8			157.3	277.5	155.8	158.9	115.3	263.6
Feb-11	98.4	303.6	63.4	202.0	256.6			159.4	60.1	248.2	107.0	278.4		461.0			162.5	279.9	155.6	160.2	117.4	264.5
Mar-11	98.2	302.8	64.5	202.9	256.4			159.7	60.0	245.6	106.8	278.5	308.3	444.0			147.3	271.0	154.4	159.5	116.5	263.6
Apr-11	98.6	304.0	60.3	202.4	256.0	401.0	45.2	151.3	60.3	245.4	104.7	278.4	329.7	402.6			141.6	267.2	151.4	158.6	116.7	263.9
May-11	98.9	305.6	55.7	199.6	256.3	400.9	50.2	109.5	60.7	247.5	108.0	279.8	331.8	406.6		214.3	143.1	268.2	153.9	158.6	117.8	265.2
Jun-11	98.8	308.1	54.2	204.1	258.4	395.1	53.7	110.1	60.0	248.4	113.0	286.2	347.0	408.4	78.4	216.1	147.4	272.3	155.5	160.3	123.9	271.9
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		151.9	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	155.5	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

Table 2: 2014 Unit Well Capacity

Start Date: January 01, 2014 **End Date: December 31, 2014**

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	2,880	4.1	1,514.0	371.5	24.5%		2,606.5	6,153.5	70.2%	29.8%
7	2,552	3.7	1,341.3	132.2	9.9%		996.4	7,763.6	88.6%	11.4%
8	1,987	2.9	1,044.4	19.4	1.9%		158.6	8,601.4	98.2%	1.8%
9	1,801	2.6	946.5	450.7	47.6%		4,291.1	4,468.9	51.0%	49.0%
11	2,131	3.1	1,120.0	629.1	56.2%		5,054.2	3,705.8	42.3%	57.7%
12	2,397	3.5	1,259.7	656.5	52.1%		4,336.5	4,423.5	50.5%	49.5%
13	2,639	3.8	1,387.0	805.4	58.1%		4,927.6	3,832.4	43.7%	56.3%
14	2,153	3.1	1,131.8	859.7	76.0%		6,789.1	1,970.9	22.5%	77.5%
15 *	2,200	3.2	1,156.3	333.3	28.8%		4,947.4	3,812.6	43.5%	56.5%
16	2,427	3.5	1,275.5	425.5	33.4%		2,978.2	5,781.8	66.0%	34.0%
17	2,325	3.3	1,222.2	449.9	36.8%		3,234.8	5,525.2	63.1%	36.9%
18	1,789	2.6	940.1	355.4	37.8%		3,424.3	5,335.7	60.9%	39.1%
19	2,115	3.0	1,111.6	475.9	42.8%		3,783.3	4,976.7	56.8%	43.2%
20	2,101	3.0	1,104.1	661.6	59.9%		5,430.6	3,329.4	38.0%	62.0%
23	1,090	1.6	573.1	74.8	13.1%		1,298.8	7,461.2	85.2%	14.8%
24	2,022	2.9	1,062.6	306.2	28.8%		2,526.2	6,233.8	71.2%	28.8%
25 *	2,000	2.9	1,051.2	405.1	38.5%		4,357.9	4,402.1	50.3%	49.7%
26	2,103	3.0	1,105.4	749.3	67.8%		6,061.3	2,698.7	30.8%	69.2%
27	2,140	3.1	1,124.8	414.3	36.8%		3,304.8	5,455.2	62.3%	37.7%
28	2,366	3.4	1,243.6	187.1	15.0%		1,328.6	7,431.4	84.8%	15.2%
29 *	2,200	3.2	1,156.3	640.3	55.4%		8,564.0	196.0	2.2%	97.8%
30	2,498	3.6	1,313.2	688.5	52.4%		4,833.5	3,926.5	44.8%	55.2%

* Denotes wells with variable frequency drives (VFDs)

Table 3: 2015 Unit Well Capacity

Start Date: January 01, 2015 **End Date:** June 30, 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	2,836	4.1	739.1	79.1	10.7%		533.8	3,810.2	87.7%	12.3%
7 *	2,200	3.2	573.4	54.1	9.4%		647.4	3,696.6	85.1%	14.9%
8	1,980	2.8	516.1	0.0	0.0%		0.0	4,344.0	100.0%	0.0%
9	1,754	2.5	457.1	209.0	45.7%		1,998.8	2,345.2	54.0%	46.0%
11	2,089	3.0	544.4	267.9	49.2%		2,134.0	2,210.0	50.9%	49.1%
12	2,431	3.5	633.7	348.6	55.0%		2,322.4	2,021.6	46.5%	53.5%
13	2,623	3.8	683.6	419.0	61.3%		2,704.5	1,639.5	37.7%	62.3%
14	2,039	2.9	531.5	420.0	79.0%		3,439.5	904.5	20.8%	79.2%
15 *	2,200	3.2	573.4	196.9	34.3%		3,130.9	1,213.1	27.9%	72.1%
16	2,304	3.3	600.6	231.1	38.5%		1,667.9	2,676.1	61.6%	38.4%
17	2,292	3.3	597.4	110.5	18.5%		792.8	3,551.2	81.7%	18.3%
18	1,807	2.6	471.1	186.4	39.6%		1,712.8	2,631.2	60.6%	39.4%
19	1,824	2.6	475.3	331.7	69.8%		3,043.6	1,300.4	29.9%	70.1%
20	2,025	2.9	527.7	316.3	59.9%		2,582.5	1,761.5	40.6%	59.4%
23	1,309	1.9	341.3	18.1	5.3%		247.7	4,096.3	94.3%	5.7%
24	2,002	2.9	521.9	242.3	46.4%		1,941.0	2,403.0	55.3%	44.7%
25 *	2,000	2.9	521.3	194.6	37.3%		2,108.9	2,235.1	51.5%	48.5%
26	2,045	2.9	533.1	361.1	67.7%		2,945.4	1,398.6	32.2%	67.8%
27	2,096	3.0	546.4	184.6	33.8%		1,473.1	2,870.9	66.1%	33.9%
28	2,380	3.4	620.3	56.9	9.2%		409.0	3,935.0	90.6%	9.4%
29 *	2,200	3.2	573.4	322.2	56.2%		4,264.3	79.7	1.8%	98.2%
30	2,411	3.5	628.3	337.8	53.8%		2,363.9	1,980.1	45.6%	54.4%

* Denotes wells with variable frequency drives (VFDs)