

## Utah Division of Water Rights Well Metering Project – Parowan Valley – 2013 Summary

During the months of April and May, 2013, sixteen ultrasonic flow meters were installed at fifteen well sites throughout the Parowan Valley. The flow meters are powered by solar panels with a battery backup. Three other site visits were made to all meter locations on June 20, August 18, and October 28, 2013 in order to inspect the meters and record the flow meter and power meter readings. During the October 28 site visit the flow meters were disconnected from their power source for the non-irrigation season.

With one exception, all meters appeared to function properly throughout the irrigation season. During a site visit approximately 2 weeks after the Burton North meter had been installed, the meter was found inoperable due to no signal between the sensors. It appeared that slightly opening a  $\frac{3}{4}$ " hose valve on the well discharge line would allow air to escape the line and restore signal between the sensors. Closing the hose valve caused the signal to again be lost. During the June 20 site visit, the  $\frac{3}{4}$ " hose valve was opened, and left open for the remainder of the season. It is unclear whether or not the meter functioned properly, as the calculated use per acre for the Burton farm was lower than any other farm.

All of the wells pumped some amount during the irrigation season prior to the meters being operational. The amounts of water pumped prior to a water meter operating is estimated in this report by, first, determining the power usage per unit of water pumped, or well rating, using the water and power meter readings when the meter began operating and the next site visit, and second, dividing the well rating by the power usage prior to the meter operating. Power meter readings were collected for all wells prior to the irrigation season, except for Church Farm 4 whose power meter was inoperable during site visits prior to water meter installation.

The attached tables and figure summarize the data collected during the 2013 irrigation season.

The following could be done for the 2014 irrigation season to improve data:

1. Attempt to have all meters operating at the start of irrigation season
2. Measure water level in wells prior to irrigation season
3. Verify all power meter multipliers during site visits
4. Take photos of power and water meter faces during site visits
5. Identify crop types during site visits

**Table 1 Power Meter Readings**

Well Name	kw-hr Multiplier	Date									
		4/18	4/23	4/24	5/1	5/7	5/15	5/29	6/20	8/18	10/28
Buckhorn 2	10	5439			6455				10056	19200	20795
Buckhorn 1	40	0				1399		4248	5408	11875	12867
Buckhorn 3	-	55183			62677				92506	80033	94996
Oaktree <sup>1</sup>	40	40645	40750						44106	42681 <sup>2</sup>	47565
Paragonah 2	40	5582			6070				9427	12872	13690
Burton South	-	73942					84929			8262 <sup>3</sup>	40928
Burton South	40						60086		61184	64617	65672
Old Farm East	-		63215			74202			19847 <sup>4</sup>	693	16679
Old Farm West	10		11468			13633			22490	33529	35897
Field One Pump	-		2923			20119			80038	52583	69782
Church Farm 2	-		38735				45781		78903	58403	88203
Church Farm 4	40					9374			13033	17180	18578
Church Farm 3	10		5521			5562	6190		11097	21308	25099
Allread	-	20360				30760			94343	55007	80476
Evans	80	4632	4795	4813						9878	10464 <sup>5</sup>

1. Power through the Oaktree well meter also supplies adjacent booster pump.
2. Oaktree reading on 8/18 was recorded as 42681; however, based on the previous and subsequent readings and water meter readings, it is believed the reading was incorrectly recorded and was actually 46281.
3. Burton south power meter assumed to have 5-digit dial and “rolled-over” twice between the 5/15 and 8/18 readings, affecting the well rating calculation.
4. Old farm east power meter assumed to have 5-digit dial and “rolled-over” between the 5/7 and 6/20 readings, affecting the well rating calculation.
5. Evans power meter was not read on 10/28. Reported reading was made on 3/25/14, prior to start of irrigation season.

**Table 2 Water Meter Readings (acre-feet)**

Well/Water Meter Name	Date								
	4/23	4/24	5/1	5/7	5/15	5/29	6/20	8/18	10/28
Buckhorn 2 North			0.0				59.3	211.6	237.6
Buckhorn 2 South			0.0				159.0	328.6	358.3
Buckhorn 1						0.0	106.8	693.2	780.7
Buckhorn 3			0.0				104.0	395.5	446.4
Oaktree	0.0						281.8	470.1	579.8
Paragonah 2			0.0				220.3	507.2	630.4
Burton South					0.0			318.0	401.9
Burton North							0.0	58.6	80.1
Old Farm East				0.0			85.1	241.5	272.1
Old Farm West				0.0			163.2	362.4	411.4
Field One Pump				0.0			119.2	261.0	293.2
Church Farm 2					0.0		60.9	208.3	260.2
Church Farm 4				0.0			360.1	761.6	896.0
Church Farm 3					0.0		85.0	274.8	344.8
Allread				0.0			134.1	262.2	307.9
Evans	0.1	3.3					381.3	694.4	788.9

Note: Reading of 0.0 indicates the date the meter readings were initiated.

**Table 3 Well Rating Calculations & Estimation of Diversions Prior to Water Meter Installation**

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>	<i>I</i>	<i>J</i>
<b>Well Name</b>	<b>Initial Power Reading</b>	<b>Power Reading at Water Meter Installation</b>	<b>Next Power Reading</b>	<b>Power multiplier</b>	<b>Power Use between Water Meter Installation and Next Reading (kw-hr) <math>(D - C) \times E</math></b>	<b>Metered Diversion between Water Meter Installation and Next Reading (AF)</b>	<b>Calculated Well Rating (kw-hr/AF) <math>F \div G</math></b>	<b>Power Use Prior to Water Meter Installation (kw-hr) <math>C - B</math></b>	<b>Estimated Diversion Prior to Meter Installation (AF) <math>H \times I</math></b>
Buckhorn 2	5439	6455	10056	10	36010	218.3	165.0	10160	61.6
Buckhorn 1	0	4248	5408	40	46400	106.8	434.5	169920	391.1
Buckhorn 3	55183	62677	92506	-	29829	104.0	286.8	7494	26.1
Oaktree	40645	40750	44106	40	134240	281.8	476.4	4200	8.8
Paragonah 2 <sup>1</sup>	5582	6070	9427	40	134280	220.3	609.5	19520	32.0
Burton South	73942	84929	8262*	-	123333	318.0	387.8	10987	28.3
Burton North <sup>2</sup>	60686	61184	64617	40	137320	58.6	2343.3	43920	18.7
Old Farm East	63215	74202	19847*	-	45645	85.1	536.4	10987	20.5
Old Farm West	11468	13633	22490	10	88570	163.2	542.7	21650	39.9
Field One Pump	2923	20119	80038	-	59919	119.2	502.7	17196	34.2
Church Farm 2	38735	45781	78903	-	33122	60.9	543.9	7046	13.0
Church Farm 4	-	9374	13033	40	146360	360.1	406.4	-	-
Church Farm 3 <sup>3</sup>	5521	6190	11097	10	49070	85.0	577.3	6690	11.6
Allread	20360	30760	94343	-	63583	134.1	474.1	10400	21.9
Evans	4632	4795	4813	80	1440	3.2	450.0	13040	29.0

\* Meter rollovers

1. Paragonah 2 calculated well rating is for water use and electric use between the 5/1 and 6/20 site visits. For subsequent intervals between site visits, the calculated rating was quite different: 480.3 kw-hr/AF between the 6/20 and 8/18 site visits and 265.6 kw-hr/AF between the 8/18 and 10/28 site visits. From the range in well rating one could assume a range in estimated use prior to meter installation from 32.0 to 73.5 AF.
2. Burton north well rating is much larger than expected. Water meter likely did not function continuously.
3. Power meter was not functioning during site visits prior to meter installation on 5/7. A diversion estimate prior to meter installation was not determined.

**Table 4 Water Use Summary**

<b>Well/Meter Name</b>	<b>Estimated Diversion Prior to Meter Installation (AF)</b>	<b>Metered Diversion (AF)</b>	<b>Total Diversion (AF)</b>	<b>Crop Type<sup>3</sup></b>	<b>Acres</b>	<b>Diversion per Acre (AF/ac)</b>
Buckhorn 2 North	61.6	237.6	657.5	Mostly corn; some alfalfa	720	3.20
Buckhorn 2 South		358.3				
Buckhorn 1	391.1	780.7	1171.8			
Buckhorn 3	26.1	446.4	472.5			
Oaktree	8.8	579.8	588.6	Corn	240	2.45
Paragonah 2 <sup>1</sup>	32.0	630.4	662.4	Alfalfa	230	2.88
Burton South	28.3	401.9	430.2	Corn	263	2.01
Burton North <sup>2</sup>	18.7	80.1	98.8			
Old Farm East	20.5	272.1	292.6	Alfalfa	272	2.73
Old Farm West	39.9	411.4	451.3			
Field One Pump	34.2	293.2	327.4	Alfalfa	874	2.50
Church Farm 2	13.0	260.2	273.2			
Church Farm 4	-	896.0	896.0			
Church Farm 3	11.6	344.8	356.4			
Allread	21.9	307.9	329.8			
Evans	29.0	788.9	817.9			

1. Paragonah 2 calculated well rating is for water use and electric use between the 5/1 and 6/20 site visits. For subsequent intervals between site visits, the calculated rating was quite different. From the range in well rating one could assume a range in estimated diversion prior to meter installation from 32.0 to 73.5 AF, resulting in a range in diversion per acre of 2.88 to 3.06 AF/ac.

2. Burton north well rating is much larger than expected. Water meter likely did not function continuously, resulting in a lower use per acre when compared to other farms.

3. Crop types per email of January 10, 2014 from Shayne Scott, Parowan Valley distribution system commissioner.

**Figure 1 Well Ratings during 2013**

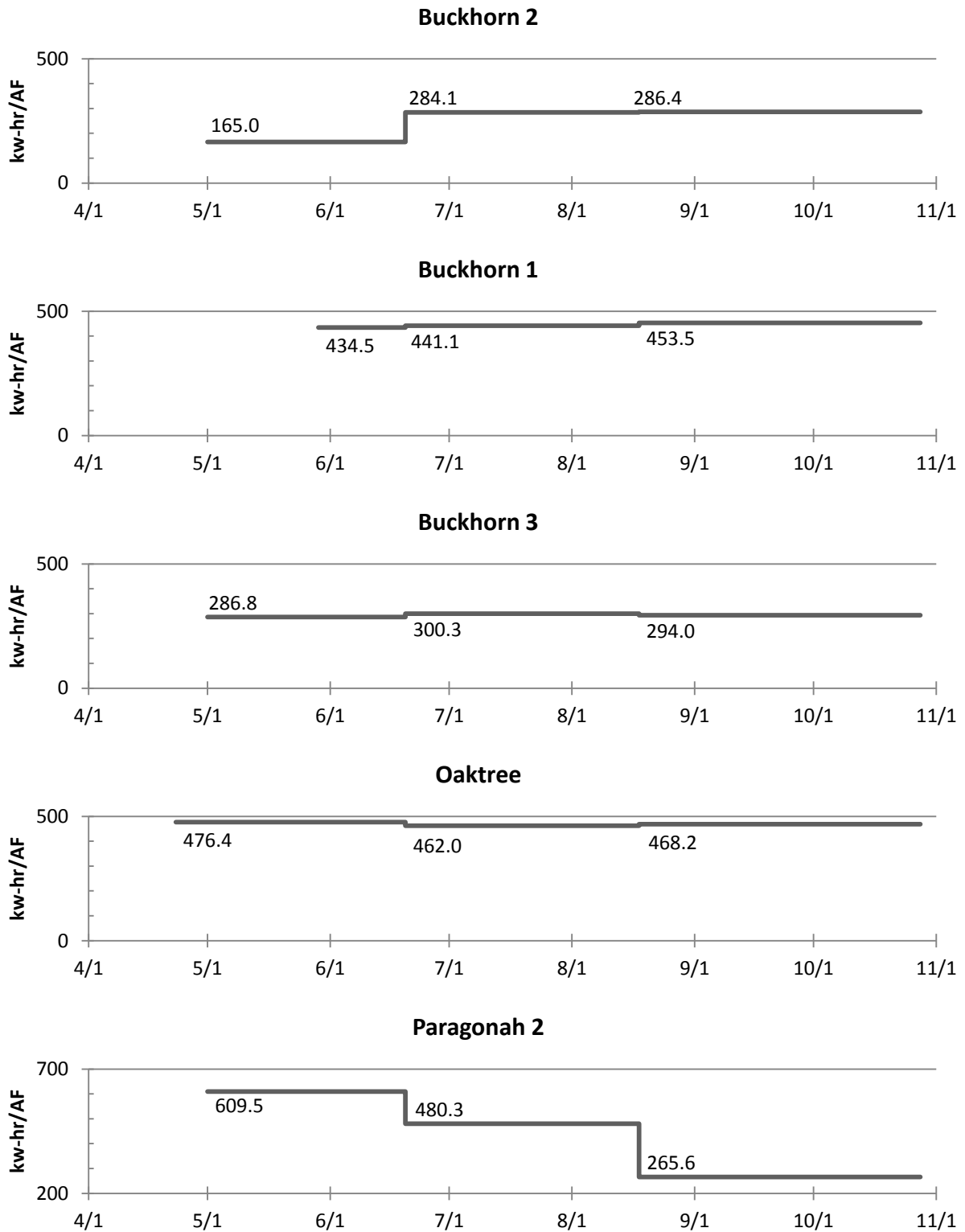


Figure 1 continued Well Ratings during 2013

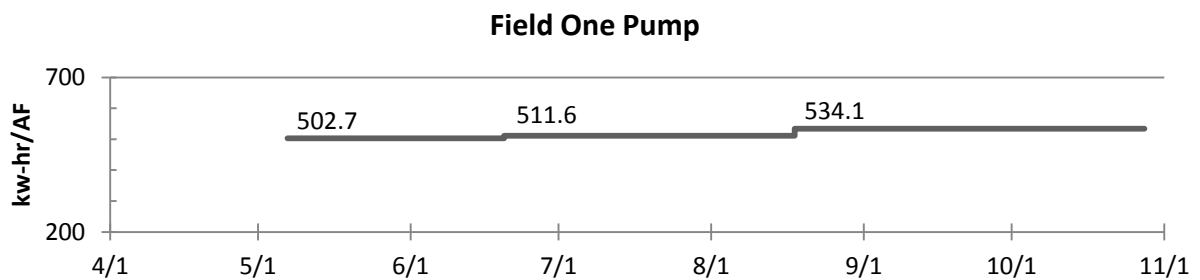
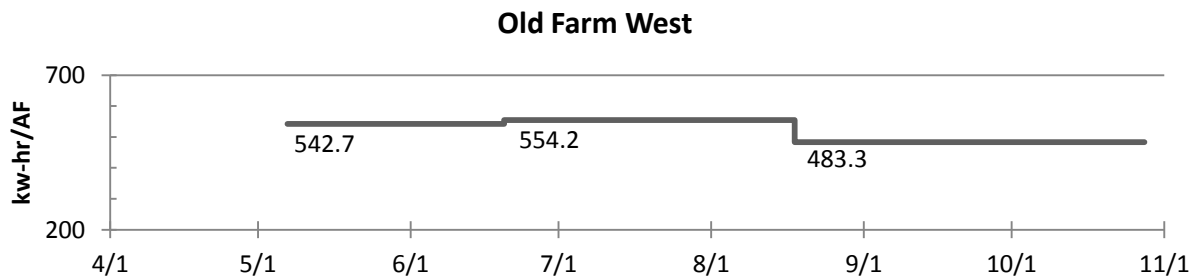
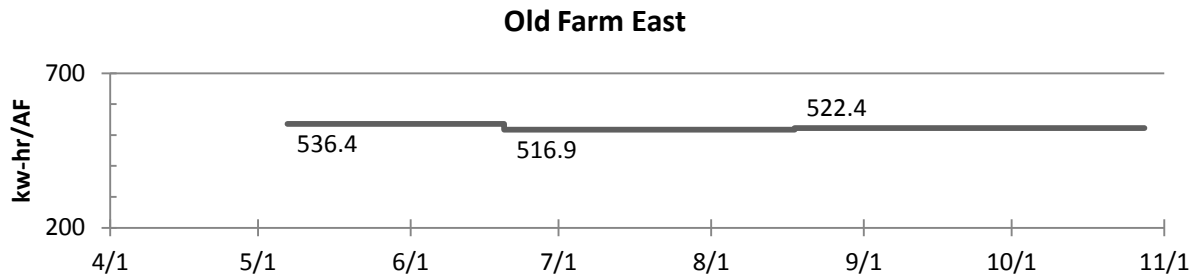
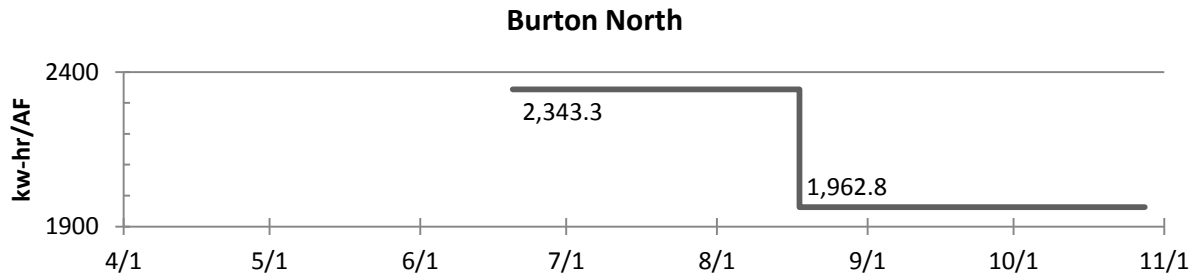
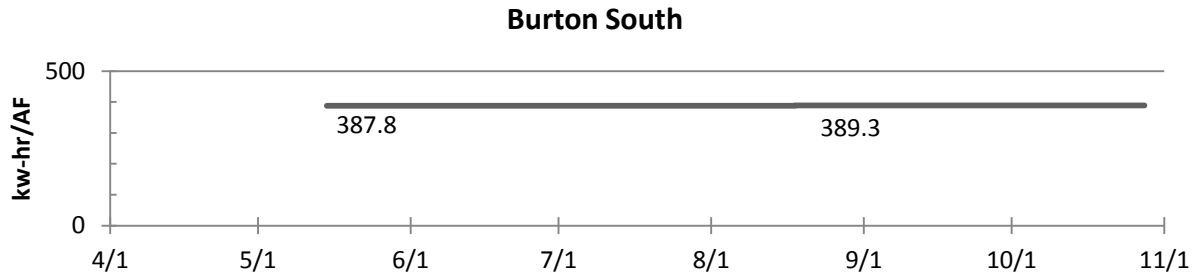


Figure 1 continued Well Ratings during 2013

