

# Auditing Water Usage, Version 1.1

By R. G. Sparber

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Seven months ago I received my water bill from the City of Phoenix. It informed me that I owed \$300 for the month's usage! A closer looked told me I had used 20,000 gallons in 4 weeks!! Of course, I looked around my property and didn't see a lake. But then a closer inspection turned up a leak near the back wall that wasn't easy to see. Yup, that was the culprit. Didn't seem like much flow but given 24 hours a day, 7 days a week, it sure added up. Beyond the cost, it really pained me to have wasted this much water while living in the Sonoran Desert. So how do I avoid this problem in the future?

My solution was to read my city water meter<sup>2</sup> every 3 days. If I got a similar leak in the future, it would cost me about \$30 (\$300 for 30 days so \$10/day). For me, that is a reasonable tradeoff between saving water and money versus my time.

The tracking is done with an Excel spreadsheet:

Date	base	increment	reading	change since first reading	number of days since first reading	average units per day	average units between adjacent dates	notes
1/29/2017	1460.00	9.70	1469.70	42.985	173	0.25	0.22	
2/2/2017	1470.00	0.38	1470.38	43.665	177	0.25	0.17	
2/12/2017	1470.00	2.86	1472.86	46.145	187	0.25	0.25	
2/14/2017	1470.00	3.03	1473.03	46.315	189	0.25	0.09	
2/19/2017	1470.00	5.01	1475.01	48.295	194	0.25	0.40	back flush valve on pool was leaking
2/23/2017	1470.00	5.77	1475.77	49.055	198	0.25	0.19	
2/28/2017	1470.00	6.81	1476.81	50.095	203	0.25	0.21	
	1470.00		1470.00	43.285	-	-	▲	
	1470.00		1470.00	43.285	-	-	-	

It tells me the average water usage per day between readings.

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<sup>2</sup> If you have an old style analog meter, see this video: <https://www.youtube.com/watch?v=e5KY9ddnRcU>

Date
1/29/2017
2/2/2017
2/12/2017
2/14/2017
2/19/2017
2/23/2017
2/28/2017

The first column is the date. I have a macro that gives me this by pressing CNTRL + ALT + D. When dates are subtracted, Excel converts each date to the number of days since 1900 so the result is number of days. This value is necessary in calculating the average water usage per day.

Date	base	increment
1/29/2017	1460.00	9.70
2/2/2017	1470.00	0.38
2/12/2017	1470.00	2.86
2/14/2017	1470.00	3.03
2/19/2017	1470.00	5.01
2/23/2017	1470.00	5.77
2/28/2017	1470.00	6.81
	1470.00	
	1470.00	

The next two columns make it easier for me to record the meter readings. My "base" holds most of the digits and my "increment" is the part that changes at a reasonable rate. You can see that between 1/29/2017 and 2/2/2017 I incremented my base from 1460.00 to 1470.00.

The units here are cubic feet but is really doesn't matter since we are looking for abnormal changes.

Date	base	increment	reading	change since first reading	number of days since first reading	average units per day	average units between adjacent dates
1/29/2017	1460.00	9.70	1469.70	42.985	173	0.25	0.22
2/2/2017	1470.00	0.38	1470.38	43.665	177	0.25	0.17
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2/19/2017	1470.00	5.01	1475.01	48.295	194	0.25	0.40
2/23/2017	1470.00	5.77	1475.77	49.055	198	0.25	0.19
2/28/2017	1470.00	6.81	1476.81	50.095	203	0.25	0.21
	1470.00		1470.00	43.285	-	-	-
	1470.00		1470.00	43.285	-	-	-

The sum of base and increment gives the "reading". After the reading column is "change since first reading" and "number of days since first reading". These values are used to calculate the long

term "average units per day", my usage reference.

Date	base	increment	reading	change since first reading	number of days since first reading	average units per day	average units between adjacent dates
1/29/2017	1460.00	9.70	1469.70	42.985	173	0.25	0.22
2/2/2017	1470.00	0.38	1470.38	43.665	177	0.25	0.17
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2/28/2017	1470.00	6.81	1476.81	50.095	203	0.25	0.21
	1470.00		1470.00	43.285	-	-	-
	1470.00		1470.00	43.285	-	-	-

The last column is the most useful number: "average units between adjacent dates". This is where I see when I have a problem.

For example, on 1/29/2017, my average usage (0.22) was slightly below the long term average (0.25). This is reasonable since we use less water in the winter. It rained

just before 2/2/2017 and my automatic irrigation system cut back. It rained a lot more before 2/14/2017 so the water usage was even less (0.09).

On 2/19/2017 it jumped up to 0.40 (red ellipse)! I had back flushed the pool filter and sure enough, the valve was not completely off. A trickle of water was coming from the back flush hose. That did the trick as shown on 2/23/2017 when the usage went down by half. Left unchecked, my water usage would have gone up by 60%.

This procedure won't tell me *what* is wrong, but does a great job of telling me *something* is not right. And it does it before my water bill gives me much worse news.

### Acknowledgement

Thanks to Marv Klotz for suggesting I include a pointer to reading the old analog water meters.

I welcome your comments and questions.

If you wish to be contacted each time I publish an article, email me with just "Article Alias" in the subject line.

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