**Stuart A. Solin vs. Missouri American Water Company**

**Refined Leakage Overcharge Analysis**

I realize that I overestimated the leakage rate in my original calculation but part of the overestimate was due to what appears to be intrinsic inaccuracies in the "Actual" meter readings reported on my billings by MoAm. For instance, for the period 2-26-15 to 5-26-15 the "Actual" reading was 0 but the leak was not fixed till 3-10-15 to 3-13-15 so there must have been leakage during this period, even if the leakage rate fluctuated. Moreover, the probability of the "Actual" reading being EXACTLY the same to the 5th digit for 5 different quarters as reported on Attachment 4 of my initial filing is essentially zero. This too raises serious questions about the accuracy of the "Actual" readings. Clearly, if MoAm is reporting grossly inaccurate meter readings as "Actual" readings, this effects its entire customer base and is something the PSC should follow up on.

In view of the above and as a "sanity check" I did a more thorough analysis of the leakage rate as follows:

Assume the leakage rate is constant and independent of the flow rate. [This is the only reasonable assumption to make absent more data.] Let

$r$ = the real usage rate in gallons/day

$l$ = the leak rate in gallons per day

For the 91 day period 5-24-14 to 8-22-14 during which our home was regularly/normally occupied the total usage was 11968 gallons so

$$91(l + r) = 11968 \quad (1)$$

For the 90 day period 8-23-14 to 11-20-14 the total usage was 8228 gallons but there were only 5 days of real usage during this period so

$$90l + 5r = 8228 \quad (2)$$

Thus we have two Equations, (1) and (2) with two unknowns, $l$ and $r$, and we can solve for the unknowns. The result is

$r = 42.45$ gallons/day and $l = 89.06$ gallons/day.

Note that the total usage based on these figures is 131.51 gallons/day which (within rounding errors) is identical to average usage, 131.565 do for the 91 day period. This is a self-consistency test.

With the leak rate derived above the overcharge for a typical 90 day quarter is

89.06 gallons/day x 90 days/quarter x $0.0041699/gallon = $33.42/quarter

and the cumulative overcharge for 5 years or 20 quarters is

20 quarters x $33.42/quarter = **$668.47**

Note: The fact that the average overcharge per quarter (during the 5 year period before the gaskets were replaced in March 2015) is higher than the $28.34 charge for the quarter beginning 8-23-14 is not surprising given the fact that I computed an average quarterly overcharge and given the above noted uncertainties/inaccuracies in MoAm's "Actual" meter readings.