Summery of Calibration Solutions for DataMaster DMT's

Recently the DataMaster Program has been experiencing problems with obtaining calibration solutions for the DataMaster that meet expectations. .

Background: The calibration solution is prepared by program staff chemists.
The solution is prepared using Absolute Ethanol and Water to create a solution of 0.10 g/210L aq etoh.
Samples of the solution are presented to the GC Mass Spec to determine and quantify the concentration of the Solution.

Problem: On May 26, 2010 my tasks for the day were to install DataMaster DMT's into Windsor County locations, including Woodstock, Hartford and Royalton VSP. I started early on this date because three DataMaster installs were going to take more then 8 hours. After loading three DataMaster DMT's and accessories into the State car I proceeded to place a DataMaster DMT at Royalton VSP, I did not perform any tests at this time because I wanted to work efficiently and not wait for the warm up period. So I then moved on to Hartford Police Department, They were not ready for me to place the new DataMaster at this location because of construction in the Processing area. So I moved on to Woodstock Police Department I arrived there sometime before noon. I set up the instrument to be installed at Woodstock PD, and while it was warming up had lunch. Upon my return from Lunch I attempted to run the installation protocol, the result of the installation was passing but it was so close to the low end of the range that I consulted with my supervisor as to what he wanted to do. The consult with my supervisor indicated that I should check everything that may affect the solution concentration, like temperature, and how well the simulator was sealing, both checks reviled that they were well within specifications so I attempted to install the instrument that was left over from Hartford. This instrument also exhibited characteristics of low vapor recover also and was not left at Woodstock for use. The time was nearing the 8 hrs by this point in time and I needed to return to Royalton and install the DataMaster there.

Upon returning to the lab I started to inspect the calibrations and certifications of the instruments that were attempted to be installed at Woodstock. While the calibrations and certifications did technically pass, they were both exhibiting LOW vapor recovery. After doing some calculations of certification solutions at the 0.08 and 0.160 levels I found out why the installations all but failed. According to the calculations at 0.08 and 0.160 the 0.10solution was predisposed to show a low vapor recovery an example is below, the recovery of 0.1 solution was going to be 3-5% low, right on the edge of the range.

Example: $\frac{.077}{.081} = \frac{x}{.100}$ and solve for x, in this example it is .095

Or

$\frac{.154}{.160} = \frac{x}{.100}$ and solve for x, in this example .096

Upon more investigation the vast majority of calibrations done with Solution 10-28-100 had very low returns. With several solutions showing low returns that were made at different times by different people the suspect solution becomes the CALIBRATION solution. This was also the time period that we started to use a CAL CHECK after calibration, but unfortunately several of these instruments used the same lot number to do the cal check as the calibration, that is going to give a good result. This was the end of this solution we had no more so another calibration solution was requested.

The next calibration solution that was created was 10-36-100 this solution has been run four times by Amanda and four times by me, on every occasion the calibration checks that were run after ran LOW. I ran the solution that was one week old on a BAC DataMaster that had just been returned from the field and has been running in the field with a valid and current certification and RPC's, this instrument indicated that our new calibration solution 10-36-100 characterized at 0.099 was running in the area of 0.103, I then expressed my concern to my supervisor, in a meeting with the program staff we agreed to run the solutions in question on a fresh from NPAS, NPAS calibrated instrument and then calibrate that same instrument with our calibration solution 10-36-100 and run the same solutions in the same simulators. The results are below.

NPAS CAL	RESULT
CA	0.100
CAL Factor	1.00314
0.100	0.096
0.099	0.100
0.102	0.096
0.097	0.102

VDH CAL	
CA	0.099
CAL Factor	0.96255
0.100	0.093
0.099	0.097
0.102	0.093
0.097	0.097

As can be seen regardless of the actual result number our calibration indicates that given the same instruments and the same calibrations the result is 3-5% lower then the original calibration done by NPAS. This result along with the result on the BAC concurs that the solution 10-36-100 seems to be some 3-5% Higher then what the solution was characterized at.

Without a solution that is characterized closer then its actual value it makes it all but impossible to continue with installations.