TECHNICAL BULLETIN
NUMBER 2014-010

Date: April 2014
Author: Stephen Moore
Subject: Software configuration instructions to correct the pH measurement to 25°C

As the temperature of a solution changes, the actual pH changes. This is not an error of the probe or meter being used, but is the actual pH of the solution at that particular temperature.

The temperature effect on the pH value is 0.003 pH units per °C away from 25°C, per pH units away from pH 7. This effect can be either negative or positive, depending on if the temperature is above or below 25°C, and if the pH is above or below pH 7.
At 25°C and pH 7, there is no change in the pH value.

The chart below shows how the actual pH changes with temperature and pH, to allow you to correct the pH reading to 25°C

As an example, if a sample measured pH 5 at a temperature of 5°C, the chart indicates this a negative effect, therefore the sample pH would be 5 – 0.12 = 4.88pH corrected to 25°C

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
T	0	0.45	0.375	0.3	0.225	0.15	0.075	0	0.075	0.15	0.225	0.3	0.375	0.45	0.525
e	5	0.36	0.3	0.24	0.18	0.12	0.06	0	0.06	0.12	0.18	0.24	0.3	0.36	0.42
m	15	0.18	0.15	0.12	0.09	0.06	0.03	0	0.03	0.06	0.09	0.12	0.15	0.18	0.21
p	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
e	35	0.18	0.15	0.12	0.09	0.06	0.03	0	0.03	0.06	0.09	0.12	0.15	0.18	0.21
r	45	0.36	0.3	0.24	0.18	0.12	0.06	0	0.06	0.12	0.18	0.24	0.3	0.36	0.42
a	55	0.54	0.45	0.36	0.27	0.18	0.09	0	0.09	0.18	0.27	0.36	0.45	0.54	0.63
t	65	0.72	0.6	0.48	0.36	0.24	0.12	0	0.12	0.24	0.36	0.48	0.6	0.72	0.84
u	75	0.9	0.75	0.6	0.45	0.3	0.15	0	0.15	0.3	0.45	0.6	0.75	0.9	1.05
r	85	1.08	0.9	0.72	0.54	0.36	0.18	0	0.18	0.36	0.54	0.72	0.9	1.08	1.26
e	95	1.26	1.05	0.84	0.63	0.42	0.21	0	0.21	0.42	0.63	0.84	1.05	1.26	1.47

Indicates a positive effect on the pH value

Indicates a negative effect on the pH value

Indicates no effect on the pH value

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 1 of 21
23.04.2014

Currently MANTECH software corrects the pH reading to the temperature of the buffer solution used in the calibration of the pH probe. As an alternative, MANTECH has now created an equation to allow for the pH reading to be corrected to 25°C, allowing pH results to be reported at the same temperature.

If customers wish to change the way their systems compensate for pH, instructions are provided below (for distributors). Distributors also have the option of having MANTECH perform these changes. Quotes can be provided on individual requirements.

This update to the software involves the following:

1. Addition of the calculation that allows for the correction to pH 25°C
2. Addition of the steps to allow the software to determine if the sample is greater or less than pH 7 and 25°C
3. Modification to the final report for the inclusion of the pH result at 25°C

To make implementation of the software changes easier, MANTECH has created exports of the required formula sets and subroutines that the dealer can simply import into the customer's database.

IMPORTANT: Please save a backup of the customer's database prior to making changes in case problems arise during import or other updates.

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 2 of 21
23.04.2014
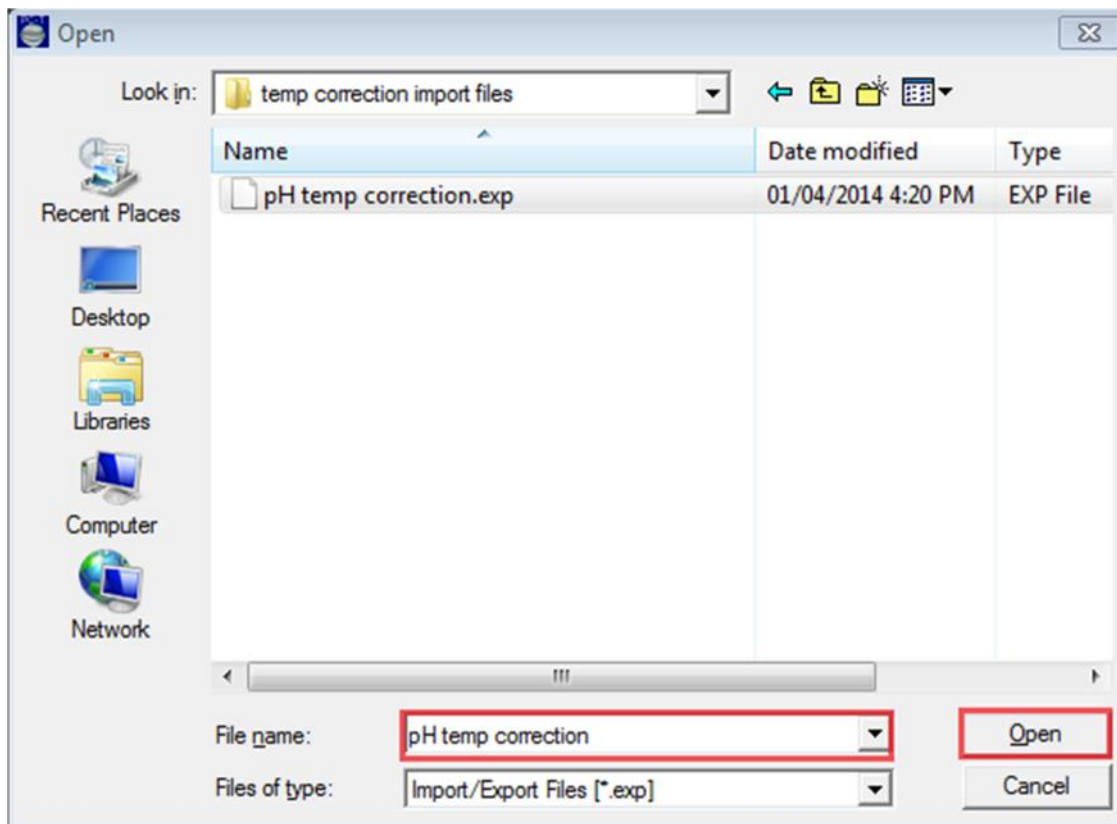
Importing Formula Sets and Subroutines:

1. From the main menu of PC-Titrate Software, go to **Utilities**, **Database Records**, and select **Import**.
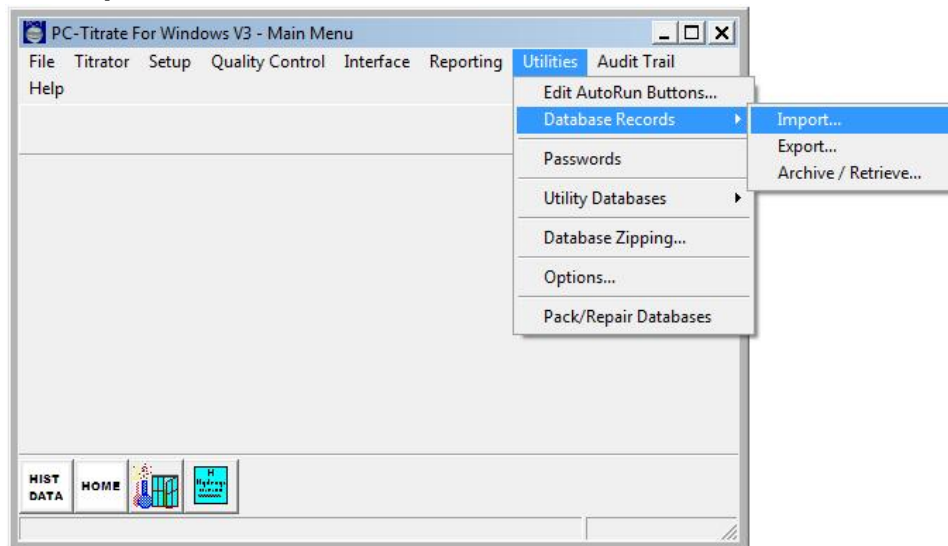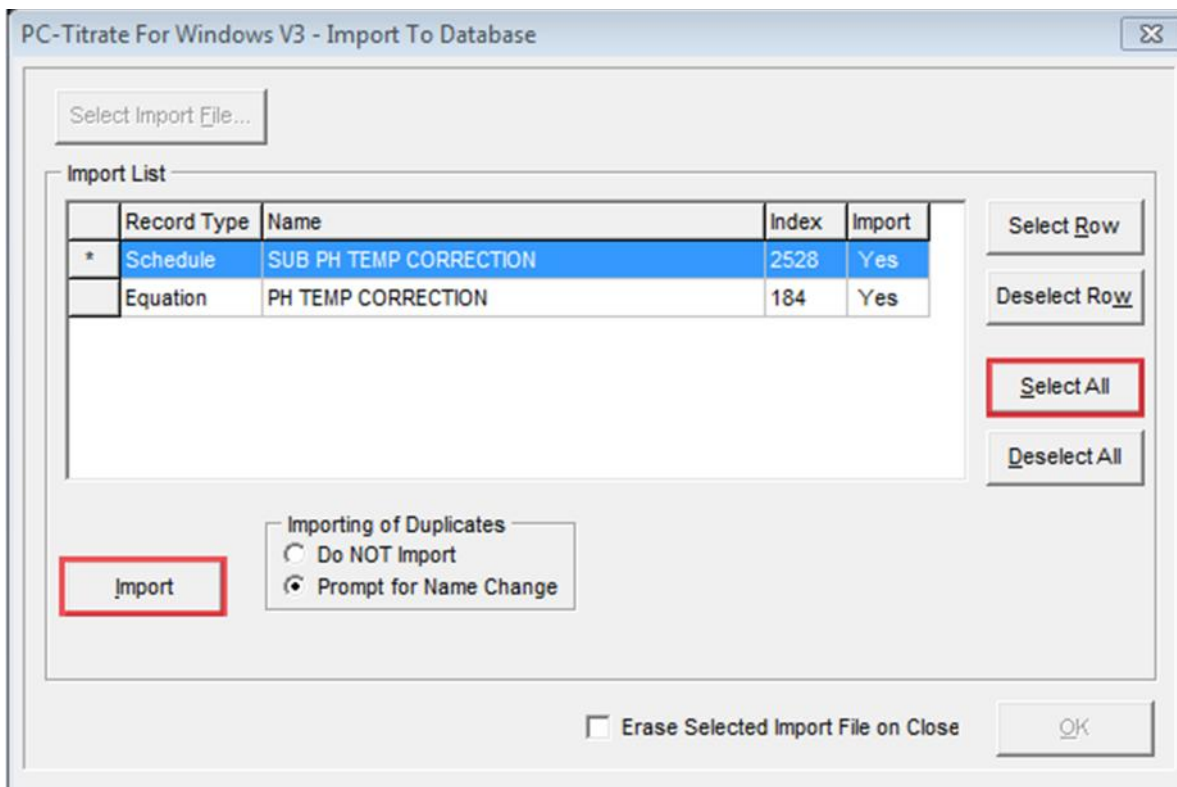

2. In the window that opens click **Select Import File**.

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 3 of 21
23.04.2014
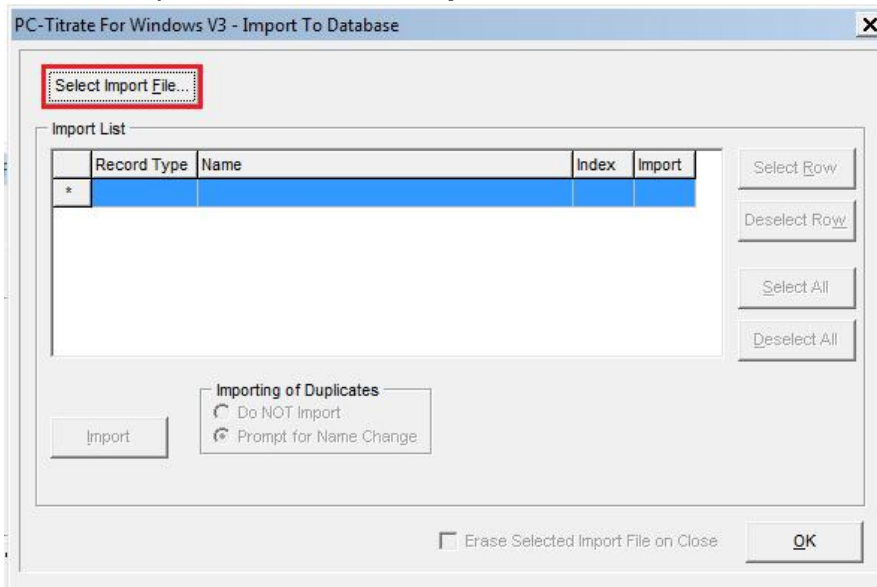
3. Locate the Import files provided by MANTECH and click Open

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 4 of 21
23.04.2014

4. This import contains the subroutines and formulas required to correct the pH readings to 25ºC. In the window that opens click the **Select All**, then the **Import** button.

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 5 of 21
23.04.2014

5. In the window that opens click **close**, and then **OK**

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 6 of 21
23.04.2014
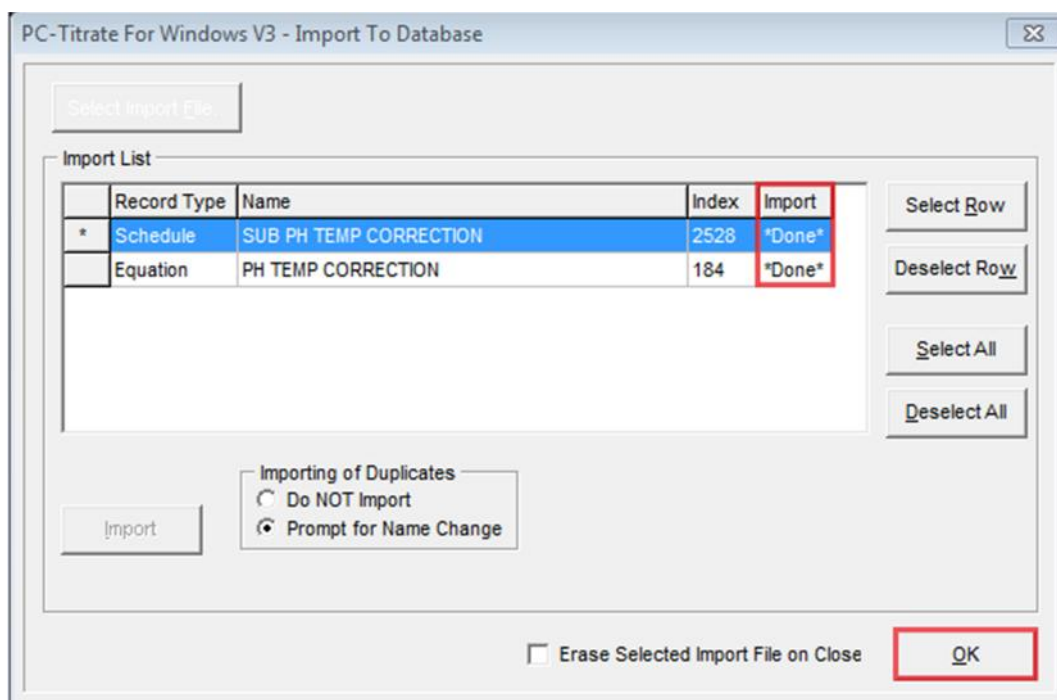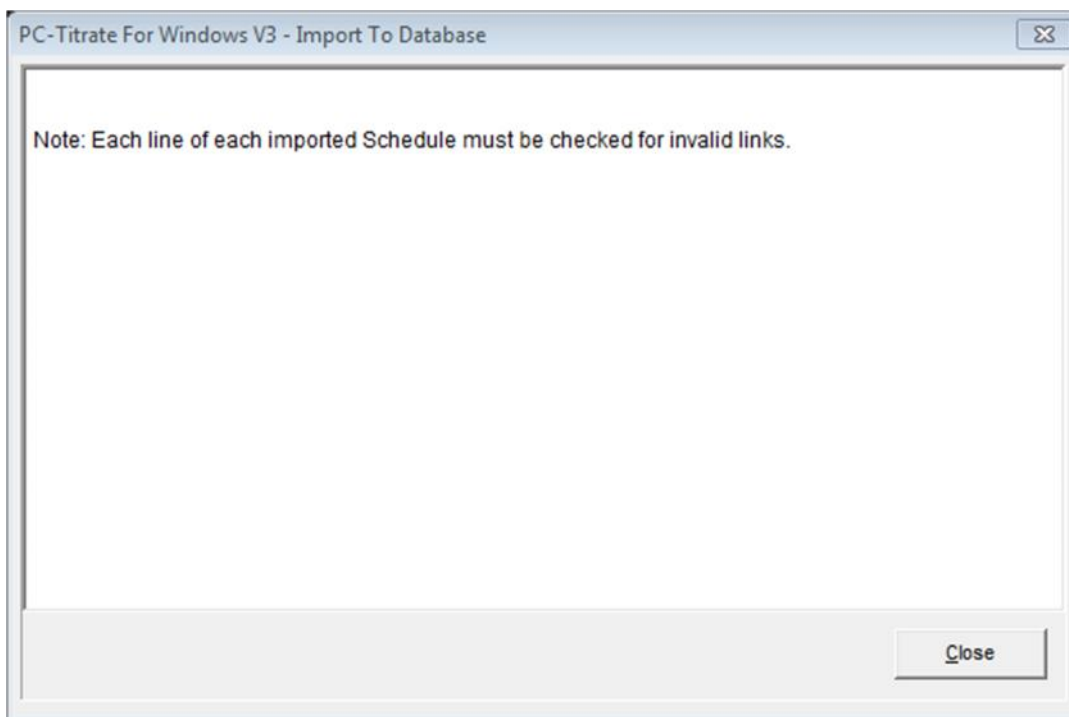
Instructions for making software changes:

Formula Set Changes:

1. From the main menu, select **Setup**, **Formula Definition**. Click the **Open Set** button and locate the **PH TEMP CORRECTION** formula set, then click **OK**. Click on each step one by one, toggling the **Y/N** button to No and then Yes. **This is required to re-link the export settings**. Once all of the lines in the formulas have been reset to export click **Save Set**, then **Done**.

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 7 of 21
23.04.2014

Schedule Changes:

1. From the main menu, select **Setup**, **Analysis Schedule**. Then at the bottom of the window, click on **Load** and select a schedule with a pH analysis in it and click **OK**
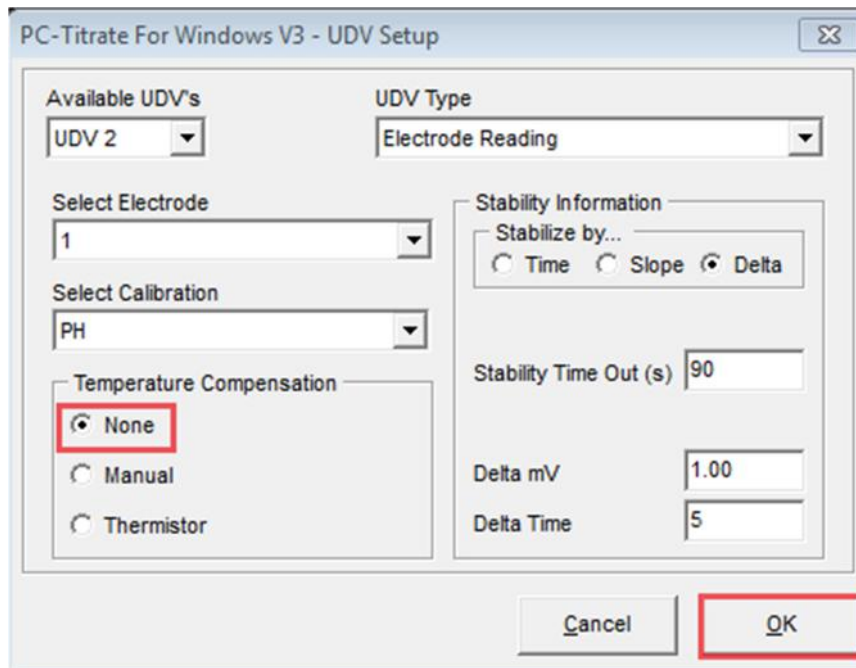
519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 8 of 21
23.04.2014

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 9 of 21
23.04.2014
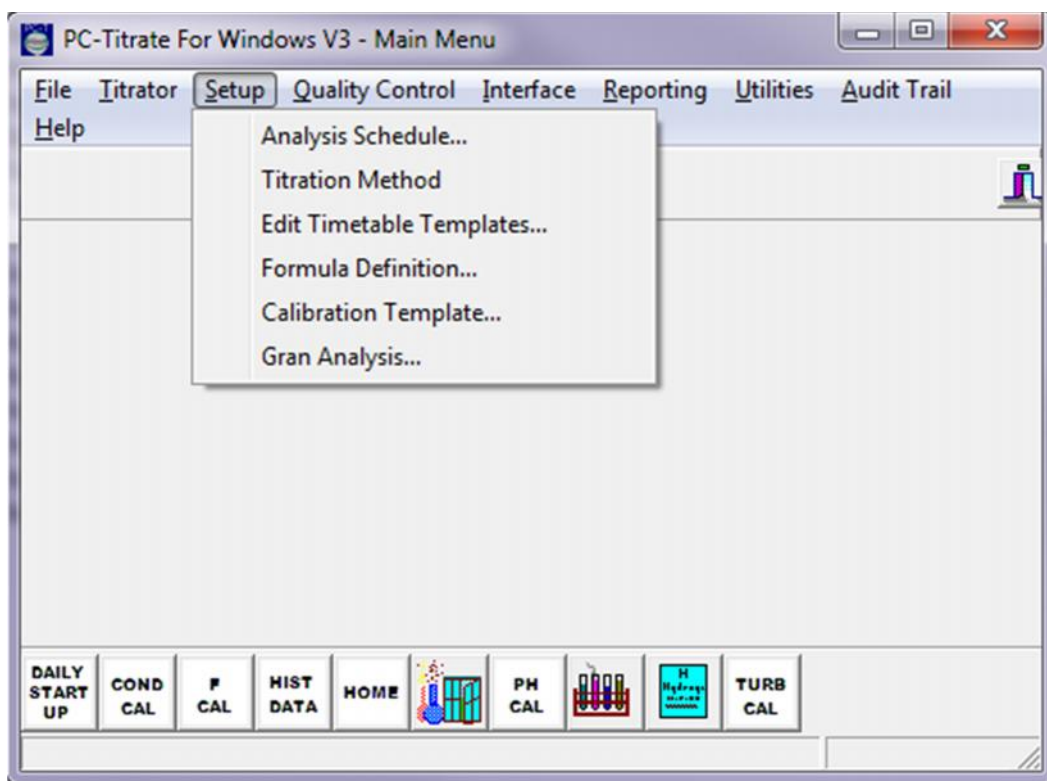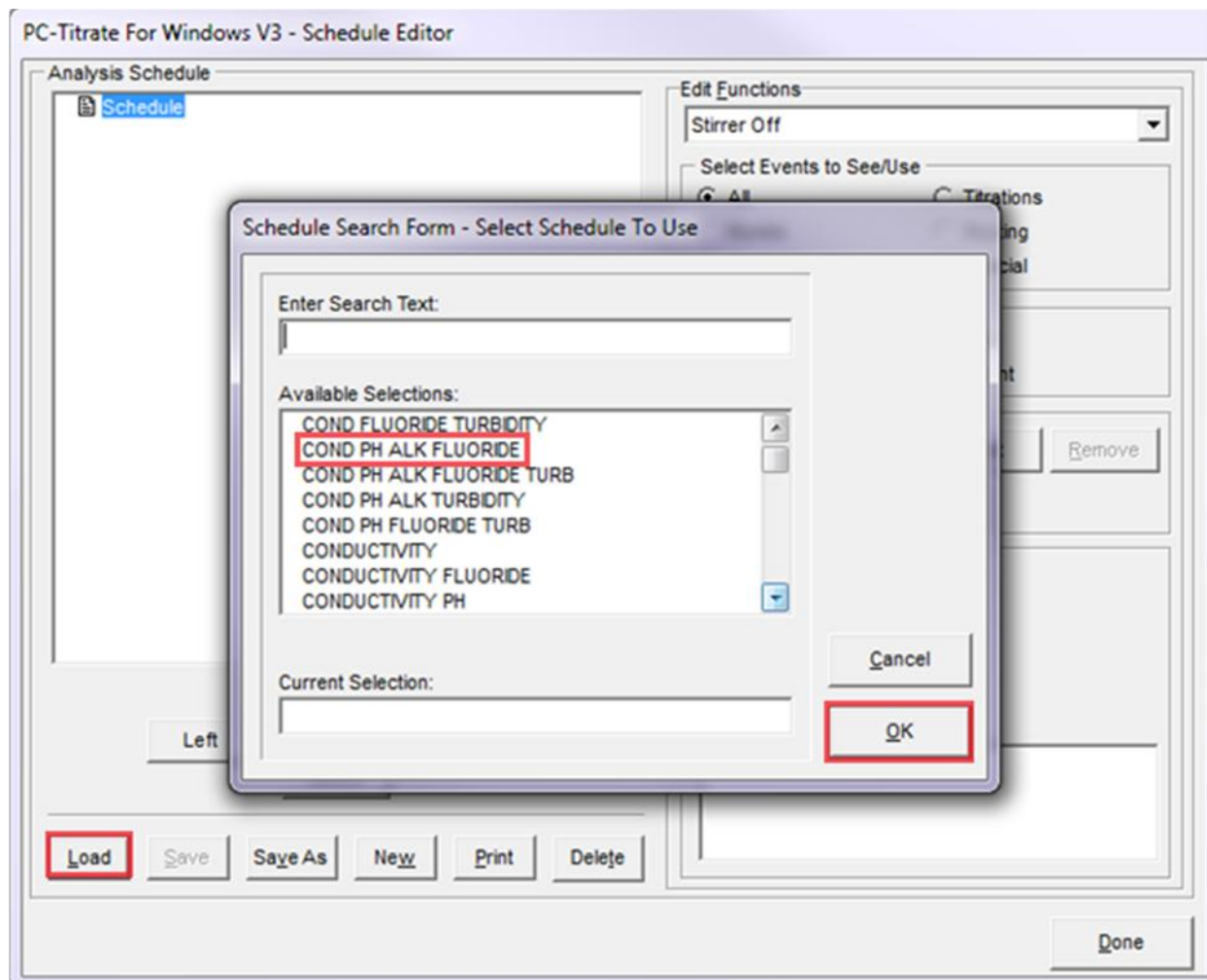
2. Locate the section in the schedule associated with the pH measurement. This can be identified by a group of five **Assign UDV** steps. This would typically be closer to the top of the schedule. To ensure it is the correct section, click once on the second Assign UDV step. On the right of the window, there will be details regarding the analysis step. Highlighted below is the information that you should see.

   Please note, the numbers maybe slightly different based on stability setting etc. The most important part is that it states **UDV #2, Electrode Reading**

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 10 of 21
23.04.2014
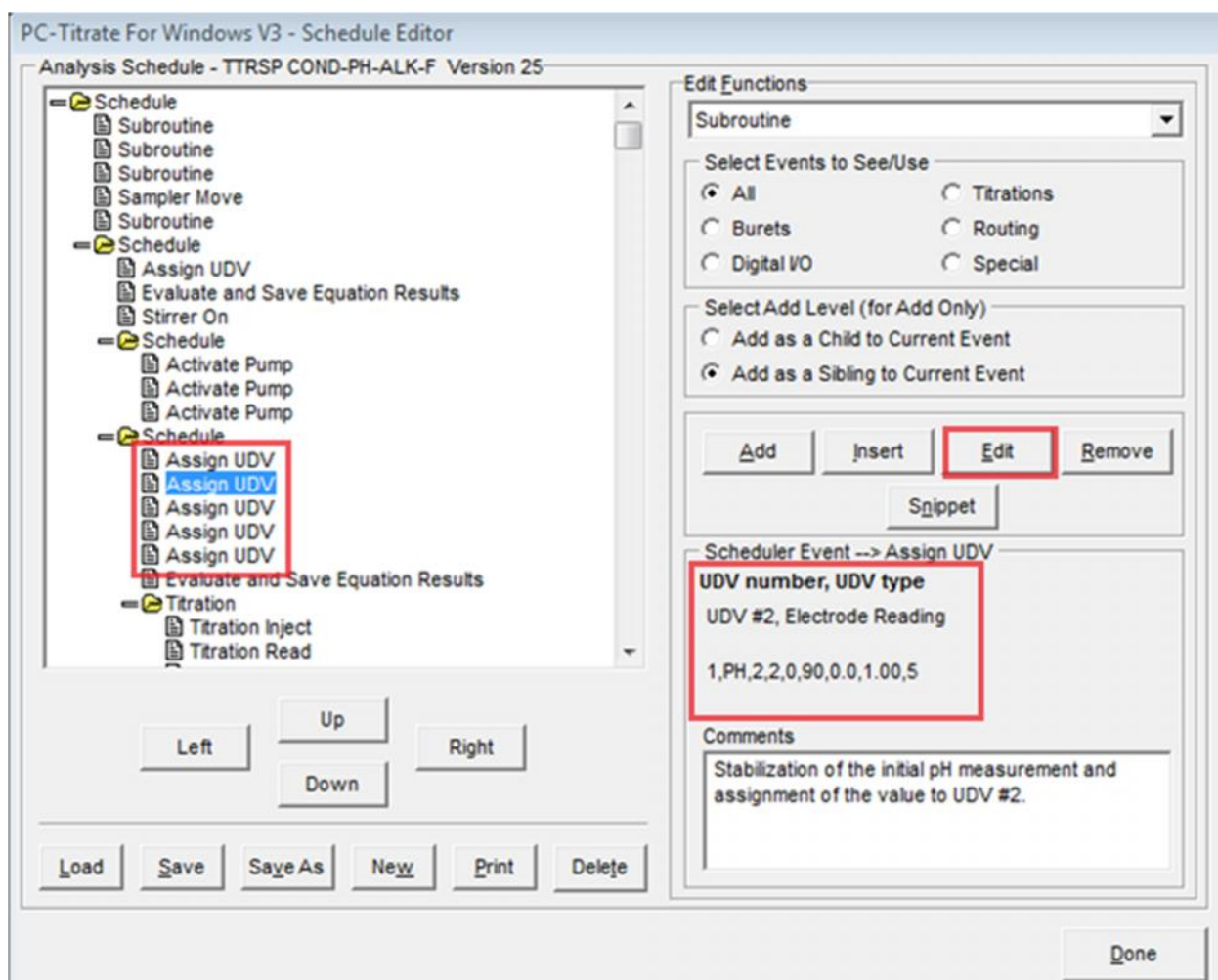
3. Click on the **Edit** button (shown in the last screenshot). For the Temperature Compensation, select **None**, and click **OK**

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 11 of 21
23.04.2014

4. Click once on the **Evaluate and Save Equation Results** step just after the five **Assign UDV** steps. This will be the pH Formula set.

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 12 of 21
23.04.2014

5. Click on the **Edit Functions** dropdown menu, and locate the **Evaluate and Save Equation Results** step**.** Then click the **Insert** button.

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 13 of 21
23.04.2014
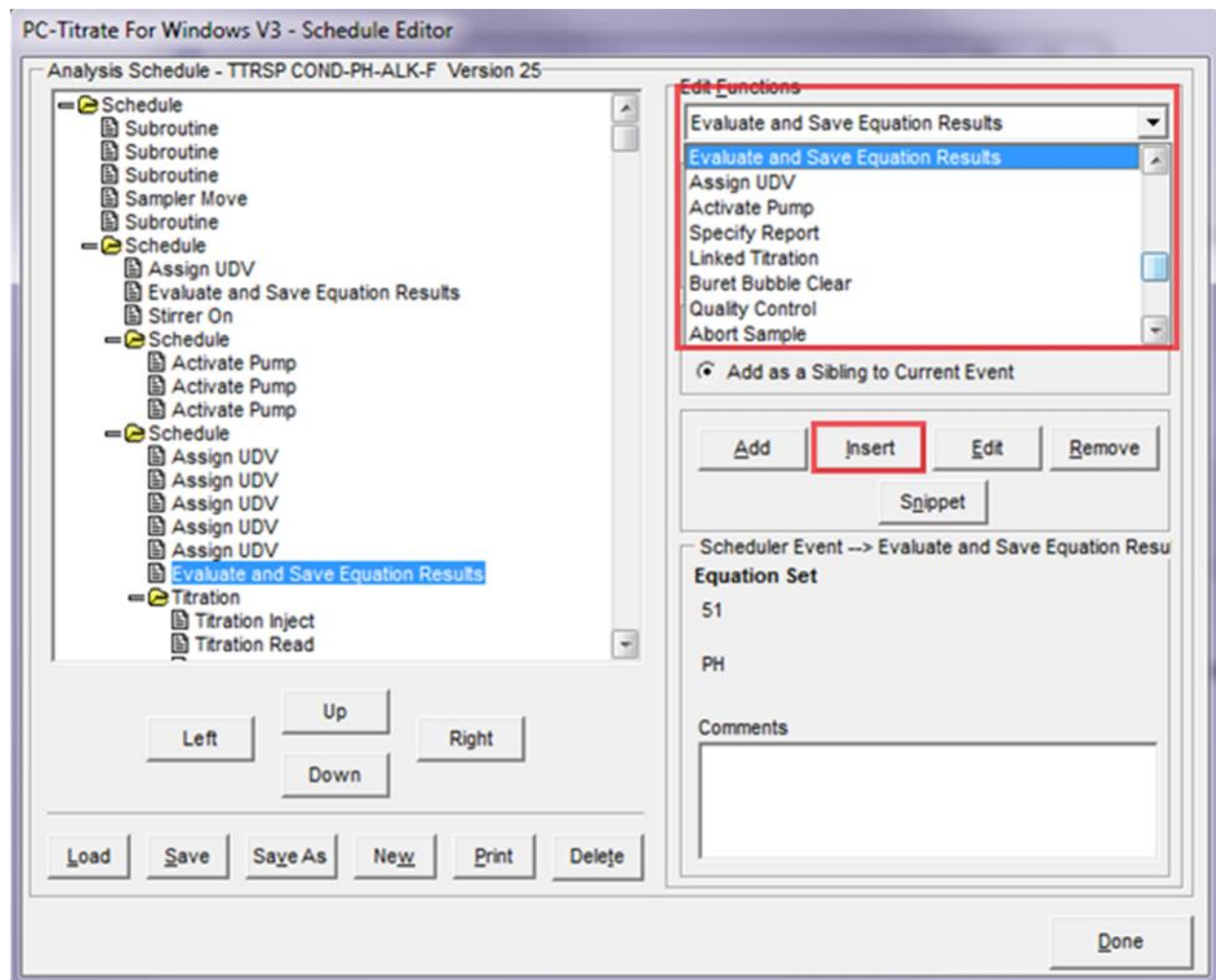
After you have clicked the insert button, you will be prompted as to which Equation set to use. Select **PH TEMP CORRECTION** from the list

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 14 of 21
23.04.2014
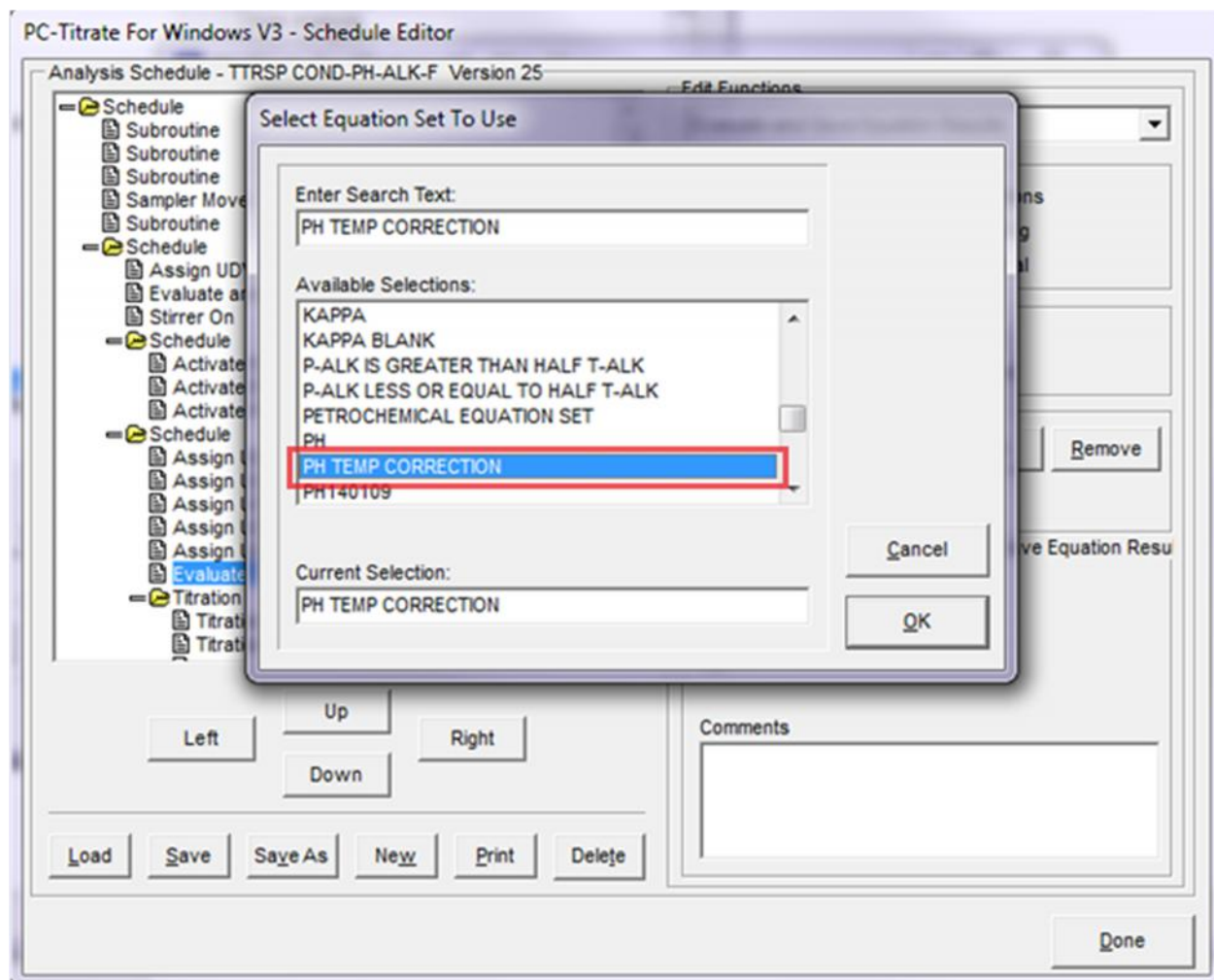
6. Click on the **Edit Functions** dropdown menu, and locate the **Subroutine** step**.** Ensure that **PH TEMP CORRECTION Evaluate and Save Equation Results** step is highlighted – as shown below**.** Then click the insert button, and select **SUB PH TEMP CORRECTION** from the list, and click **OK**

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 15 of 21
23.04.2014
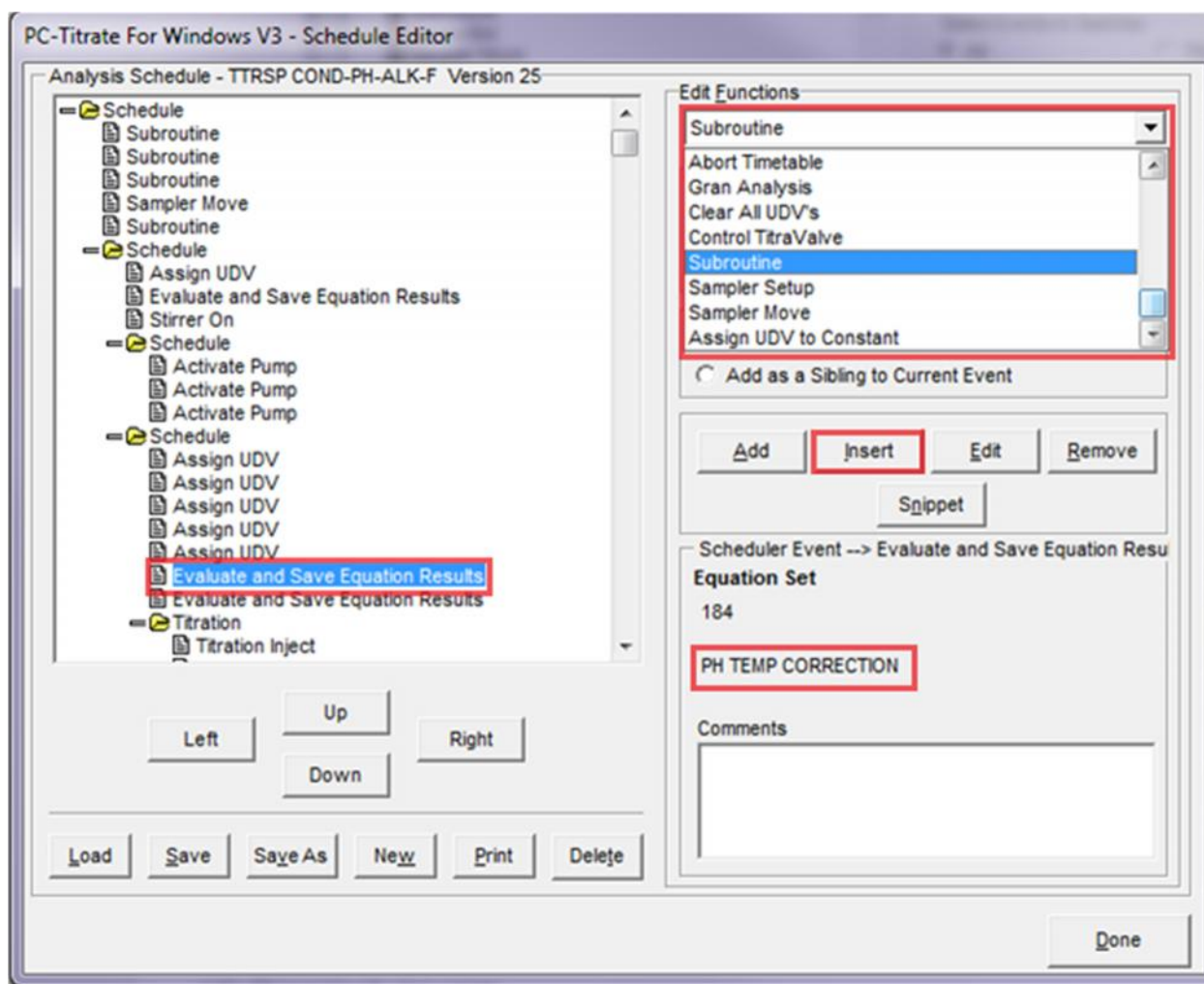
7. Click on the second **Evaluate and Save Equation Results**, this should be the **PH** Equation Set. Click the **Up** button twice

519.763.4245
www.mantech-inc.com
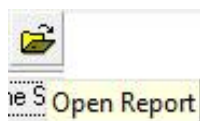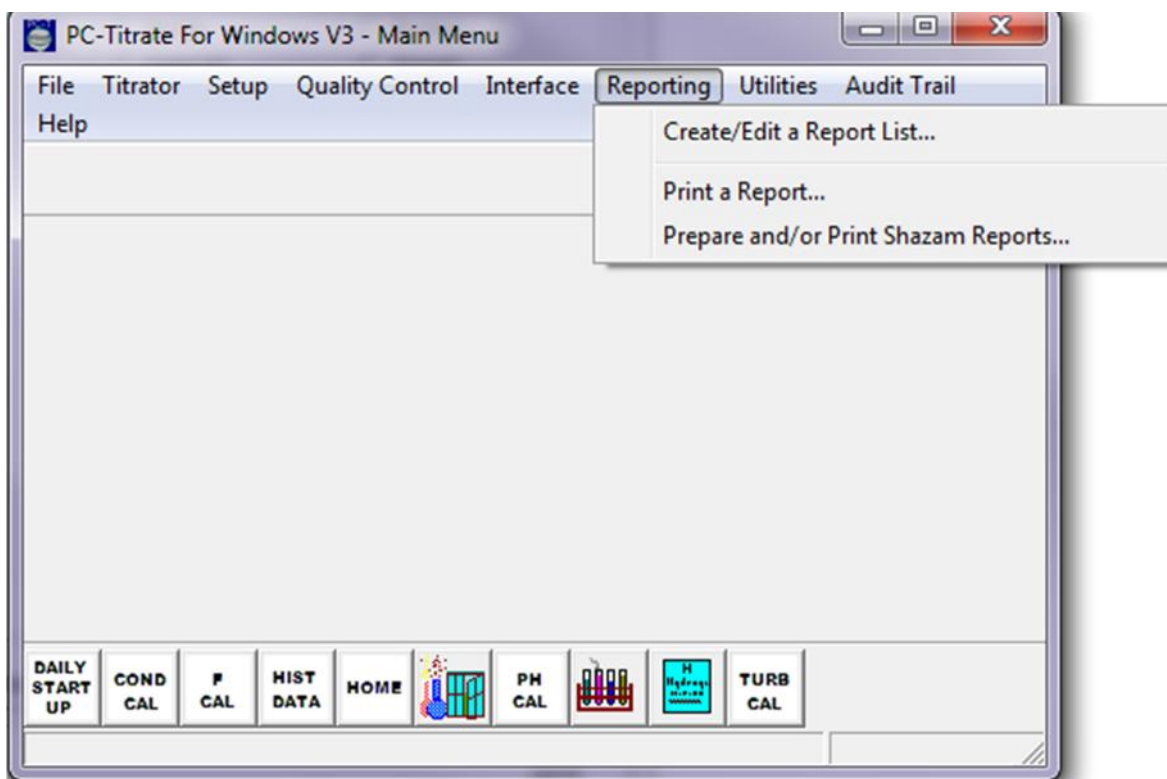info@mantech-inc.com

Page 16 of 21
23.04.2014
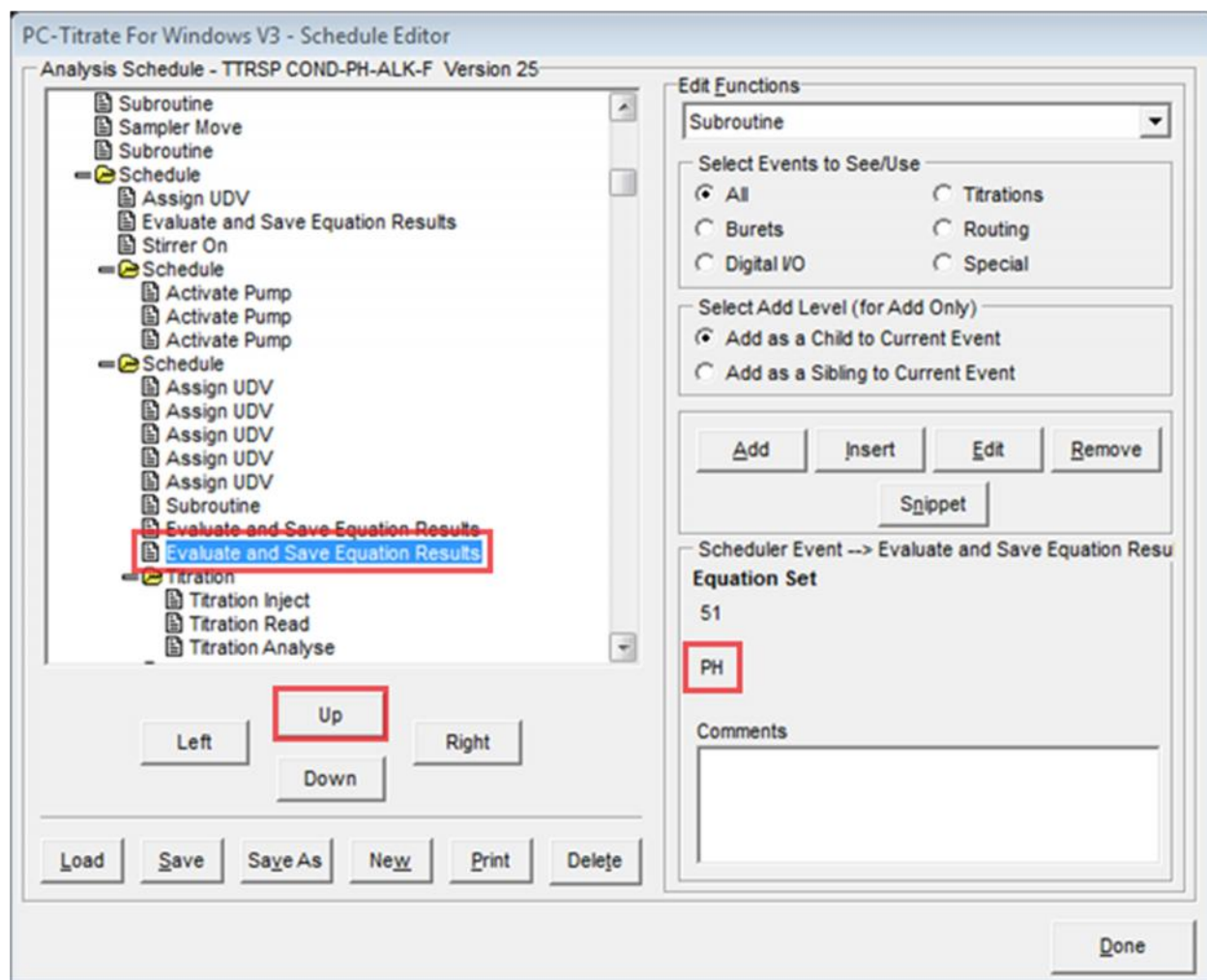
8. The schedule should now look like this. Click the **Save** button to save the changes
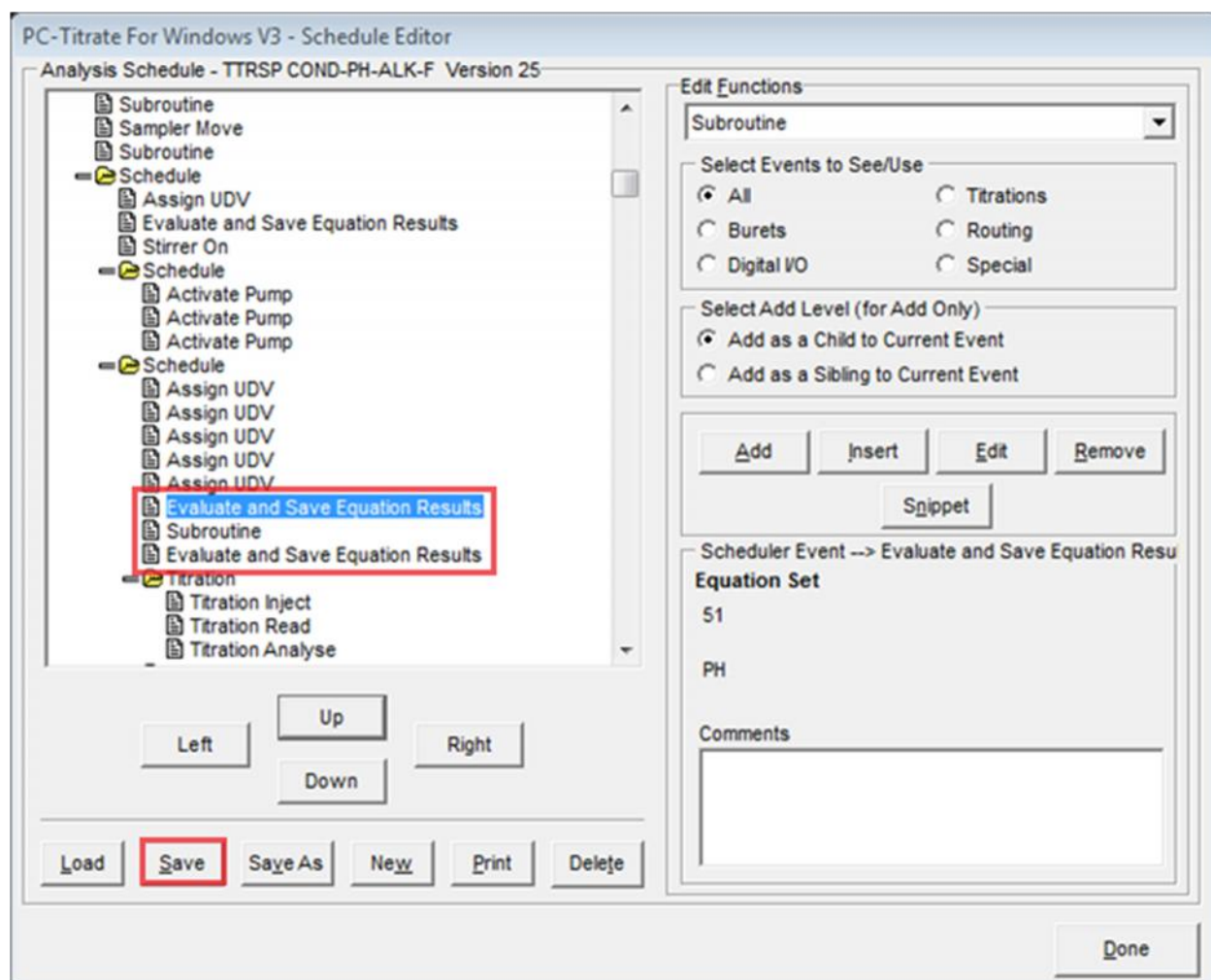
Repeat Steps 1-8 for all schedules that contain a pH analysis

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 17 of 21
23.04.2014

9. From the main menu select **Reporting, Prepare and/or Print a Shazam Reports.**

 Click the Open report icon

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 18 of 21
23.04.2014

Select the **Water Analysis Report**, and click **Open**

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 19 of 21
23.04.2014
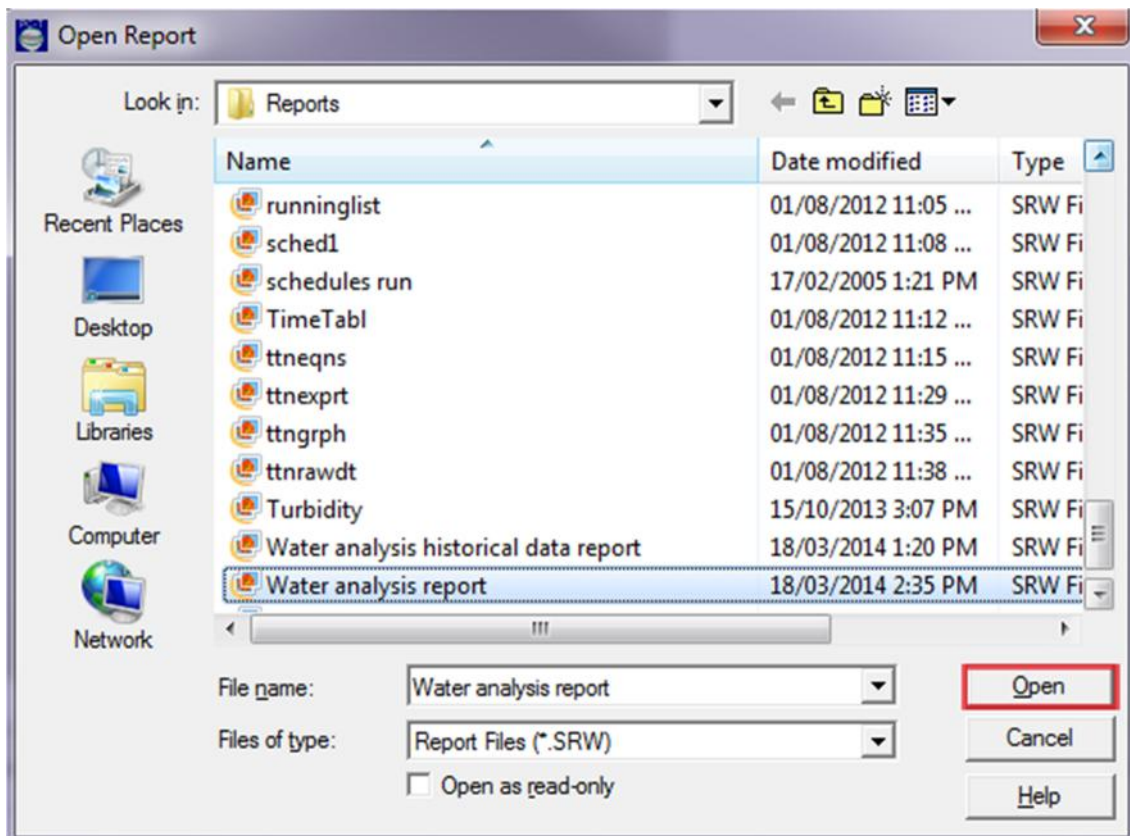
10. Click on the **Layout Page** tab, and click on the **pH** header
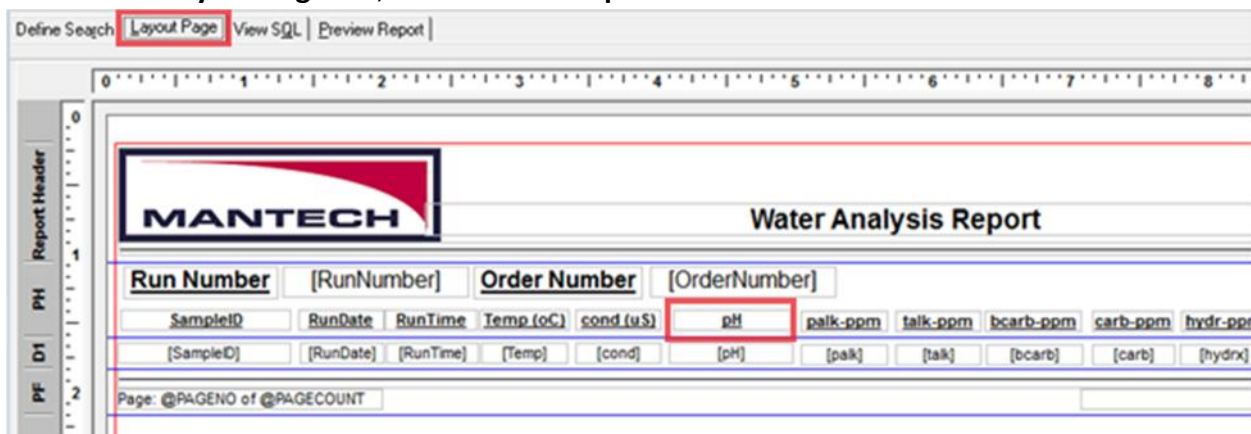
11. Right click on the **pH** header and select **Edit Caption** from the list, then edit the caption to read **pH at 25C,** then click on the red X to close the window, then Save the report as the same name.
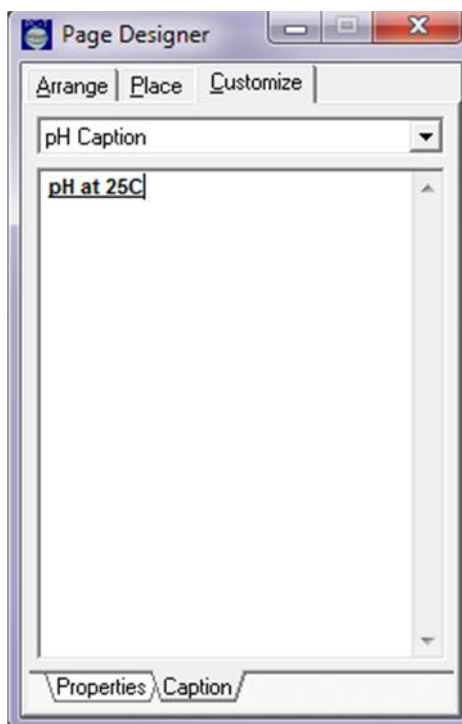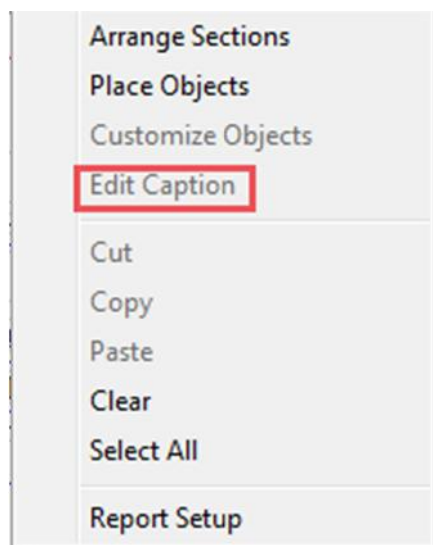
Repeat 9-11 for the Water Analysis Historical Data Report

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 20 of 21
23.04.2014

Note: All uncorrected pH readings will be saved into the pH database, but will not be reported in the final report

For all future system orders containing pH the Distributors should specify if the pH should be reported as the standard way (corrected to the buffer temperature) or to $25^{\circ}C$

The pH corrected to $25^{\circ}C$ is now set-up. All the schedules should be tested prior to running routine analysis.

519.763.4245
www.mantech-inc.com
info@mantech-inc.com

Page 21 of 21
23.04.2014