Lugeon Test Tutorial

Schlumberger
Water Services

2014.1
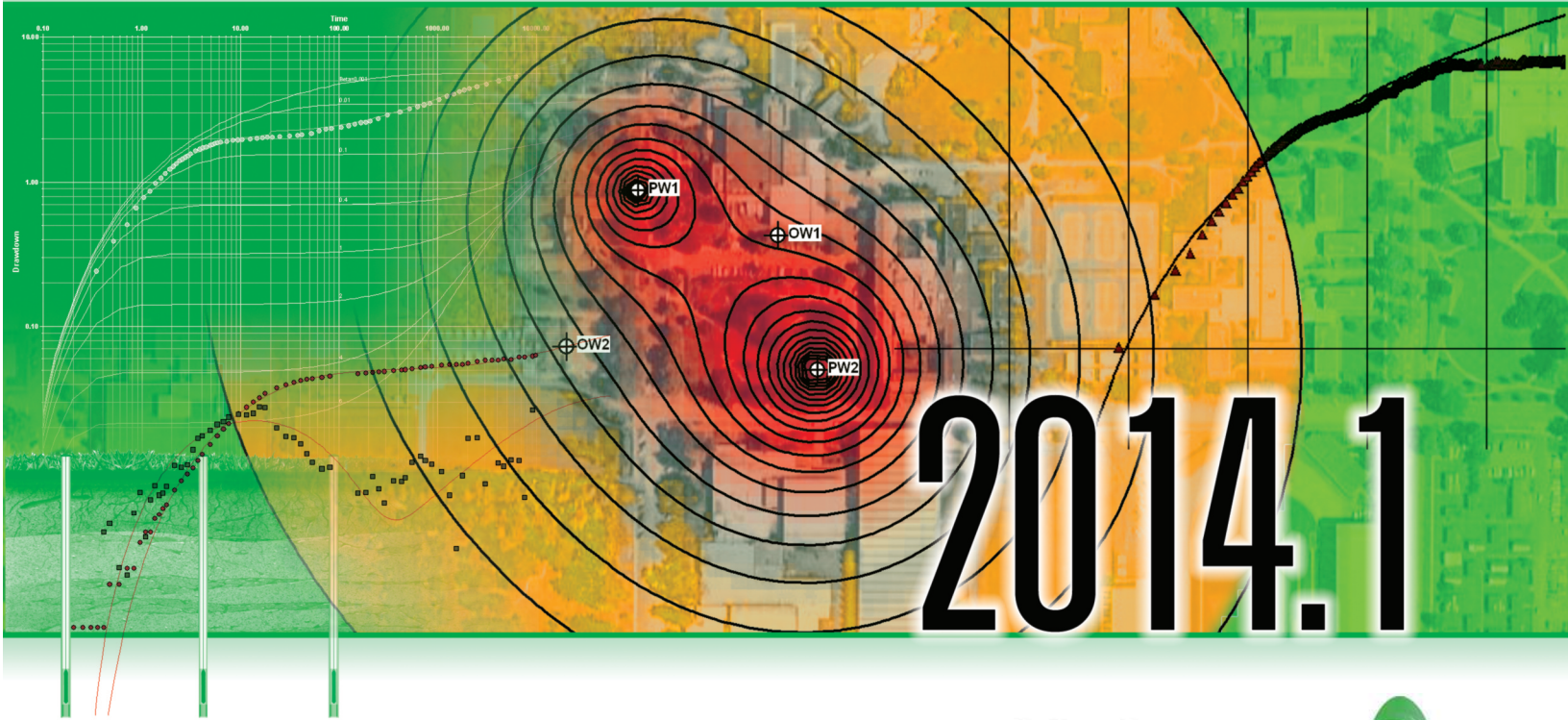
Hydrosens
für Wasser, Boden und Luft

AquiferTest Pro

An Easy-to-Use Pumping Test and Slug Test Data Analysis Package

Lugeon Test Tutorial

This exercise is written with the assumption that you are familiar with Lugeon Test methodology and data requirements, and are familiar with the **AquiferTest** interface.

1. Start **AquiferTest,** or if you already have it open, create a new project by clicking the ☐ (**New**) icon in the toolbar or selecting **File > New** from the main menu.
2. Create a new "Lugeon Test" by selecting **Test > Create a Lugeon Test** from the main menu.
3. Complete the fields for the Slug Test as follows:
4. For the **Project Information** Frame

-   **Project Name:** Lugeon Example
-   **Project No.:** 1
-   **Client:** ABC
-   **Location:** Your Town

5. For the **Lugeon Test** Frame

-   **Name:** Lugeon Test Analysis
-   **Performed by:** Your Name
-   **Date:** filled in automatically

6. For the **Flow Meter Type** Frame, choose "Volume" radio button.

7. For the **Units** frame:

-   **Site Plan:** m
-   **Dimensions:** m
-   **Volume:** m3
-   **Pressure:** psi

8. For the **Geometry** frame:

-   **Pressure Reading:** Borehole Transducer
-   **Top:** 0
-   **Bottom:** 8.5
-   **Depth to GW:** 4.25

9. Fill in the details for the TestBore in the table at the bottom:

-   **Name: BH-01**
-   **X:** 0
-   **Y:** 0
-   **Elevation:** 0
-   **Benchmark:** 0
-   **B:** 0.096

This completes the section for the project/test information. Once you are finished, the Lugeon Test tab should appear as shown below:
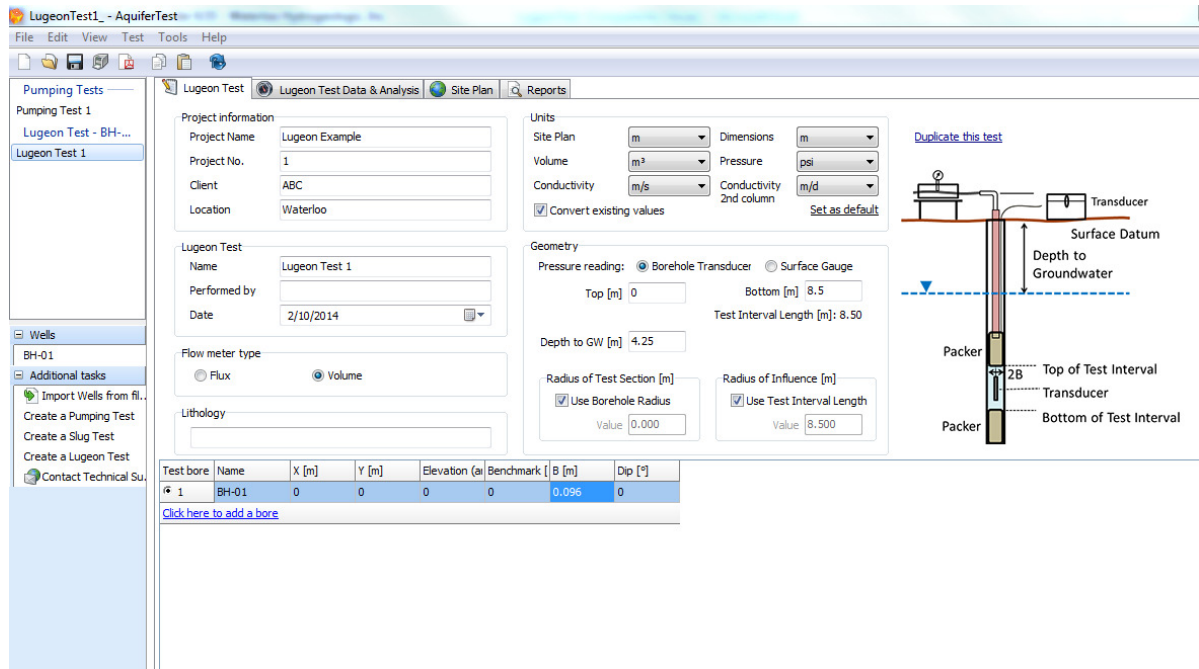
10. Click on the "Lugeon Test Data & Analysis" tab from the top of the main window. Define the following settings (at the top).

- **# of flow readings:** 10
- **# of pressure steps:** 5
- **Analysis Performed by:** Your name

11. Enter the following data in the "Gauge Pressure" column, for the corresponding step.

Step #	Gauge Pressure (PSI)
1	41.5
2	62.5
3	78.0
4	62.0
5	40.0

12. Next you will enter the flow readings into the main table; this can be done manually "by-hand" which is recommended if you are copying directly from field notes. Alternatively, if you have the data already in an Excel worksheet, you can copy from Excel and paste into the grid in AquiferTest (quicker and easier). Follow one of the options below:

- **Manual data entry**: Enter the following data shown in the table below, for the "Flow Meter Readings".. This can be done manually (following the data shown in the table below).

Start with the first empty row in the grid. This corresponds to the flow readings for Step 1. Enter the value for Flow Reading 1, Step 1, then work your way to the right, and enter the remaining Flow Readings for Step #1. Once finished, proceed to the second row in the grid, and enter the flow readings for Step 2.
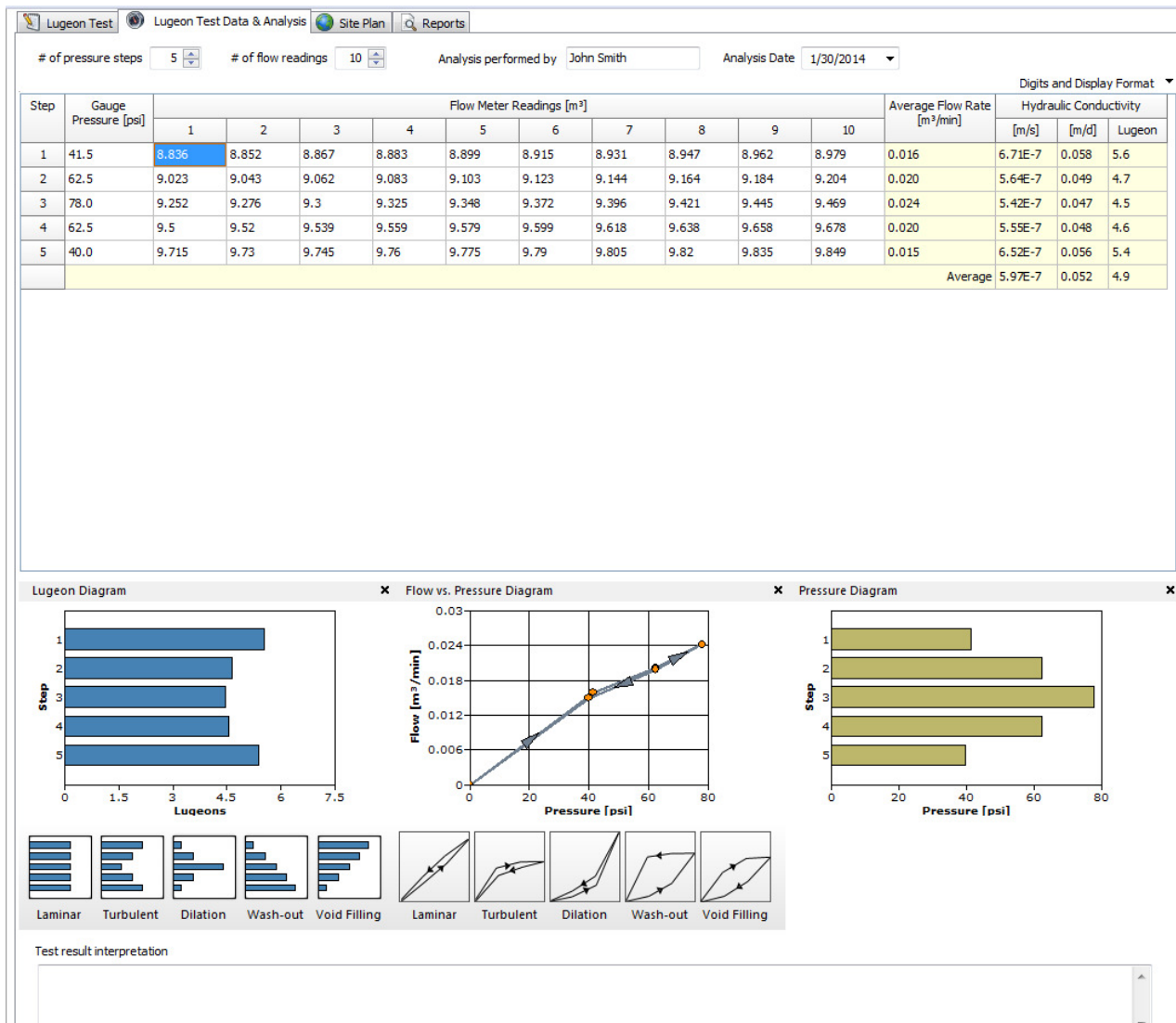
Step #	Gauge Pressure (psi)	Flow Readings (m3)									
		1	2	3	4	5	6	7	8	9	10
1	41.5	8.836	8.852	8.867	8.883	8.899	8.915	8.931	8.947	8.962	8.979
2	62.5	9.023	9.043	9.062	9.083	9.103	9.123	9.144	9.164	9.184	9.204
3	78	9.252	9.276	9.3	9.325	9.348	9.372	9.396	9.421	9.445	9.469
4	62	9.5	9.52	9.539	9.559	9.579	9.599	9.618	9.638	9.658	9.678
5	40	9.715	9.73	9.745	9.76	9.775	9.79	9.805	9.82	9.835	9.849

- **Importing from Excel**: Browse to your installation folder, and locate the "ImportFiles" directory (default is "C:\Program Files (x86) \AquiferTest\ImportFiles\..", and open LugeonTest.xls. This should load into MS Excel. Select the first flow reading in cell B3 and drag a box to the last flow reading, in cell K7, to select all flow readings for all the steps. The selection should appear as shown below.
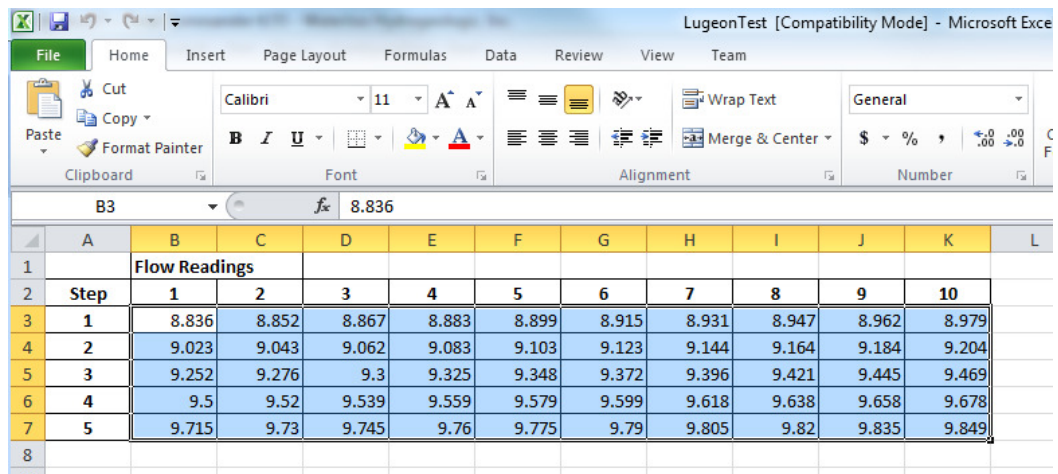
Select Copy (or Ctrl + C on keyboard) to copy the selection to the clipboard.
Minimize your Excel window, and re-activate AquiferTest.
Select the cell corresponding to Flow Meter Reading 1, in Step 1, adjacent to the Gauge Pressure Reading
Select the Paste button from the toolbar (or Ctrl + V on the keyboard) to paste the data into the grid.

13. When you are finished entering the data, the "Lugeon Test Data & Analysis" tab should appear as shown below.

# of pressure steps 5   # of flow readings 10   Analysis performed by John Smith   Analysis Date 1/30/2014

Digits and Display Format ▼

Step	Gauge Pressure [psi]	Flow Meter Readings [m³]										Average Flow Rate [m³/min]	Hydraulic Conductivity		
		1	2	3	4	5	6	7	8	9	10		[m/s]	[m/d]	Lugeon
1	41.5	8.836	8.852	8.867	8.883	8.899	8.915	8.931	8.947	8.962	8.979	0.016	6.71E-7	0.058	5.6
2	62.5	9.023	9.043	9.062	9.083	9.103	9.123	9.144	9.164	9.184	9.204	0.020	5.64E-7	0.049	4.7
3	78.0	9.252	9.276	9.3	9.325	9.348	9.372	9.396	9.421	9.445	9.469	0.024	5.42E-7	0.047	4.5
4	62.5	9.5	9.52	9.539	9.559	9.579	9.599	9.618	9.638	9.658	9.678	0.020	5.55E-7	0.048	4.6
5	40.0	9.715	9.73	9.745	9.76	9.775	9.79	9.805	9.82	9.835	9.849	0.015	6.52E-7	0.056	5.4
											Average		5.97E-7	0.052	4.9

Lugeon Diagram

Flow vs. Pressure Diagram ✕

Pressure Diagram ✕

Laminar   Turbulent   Dilation   Wash-out   Void Filling   Laminar   Turbulent   Dilation   Wash-out   Void Filling

Test result interpretation

Notice that once the data has been entered, AquiferTest will automatically calculate the Conductivity and Lugeon values for each step, average values for all steps, and populated the diagrams at the bottom of the display.

14. You are now ready to do the interpretation. This involves assessing the Lugeon Diagram and the Flow vs. Pressure Diagram, and comparing the observed patterns to a set of "Diagnostic" images. You will see this data set is indicative of "Turbulent" conditions.

15. Click on the "Turbulent" icon below the Lugeon Diagram, and this condition will be added to the "Test Result Interpretation" at the bottom of the window. You will also see the calculated average values for the average Lugeon value and Hydraulic Conductivity

    Lugeon: 5.8
    Hydraulic Conductivity: 6.75E-7 m/s
    Hydraulic Conductivity: 5.88E-2 m/d

16. Click on the Reports tab, and select the Lugeon Test Reports as shown below (be sure you have the "BH-01" item checked on and selected in the tree, under "Select Printouts"
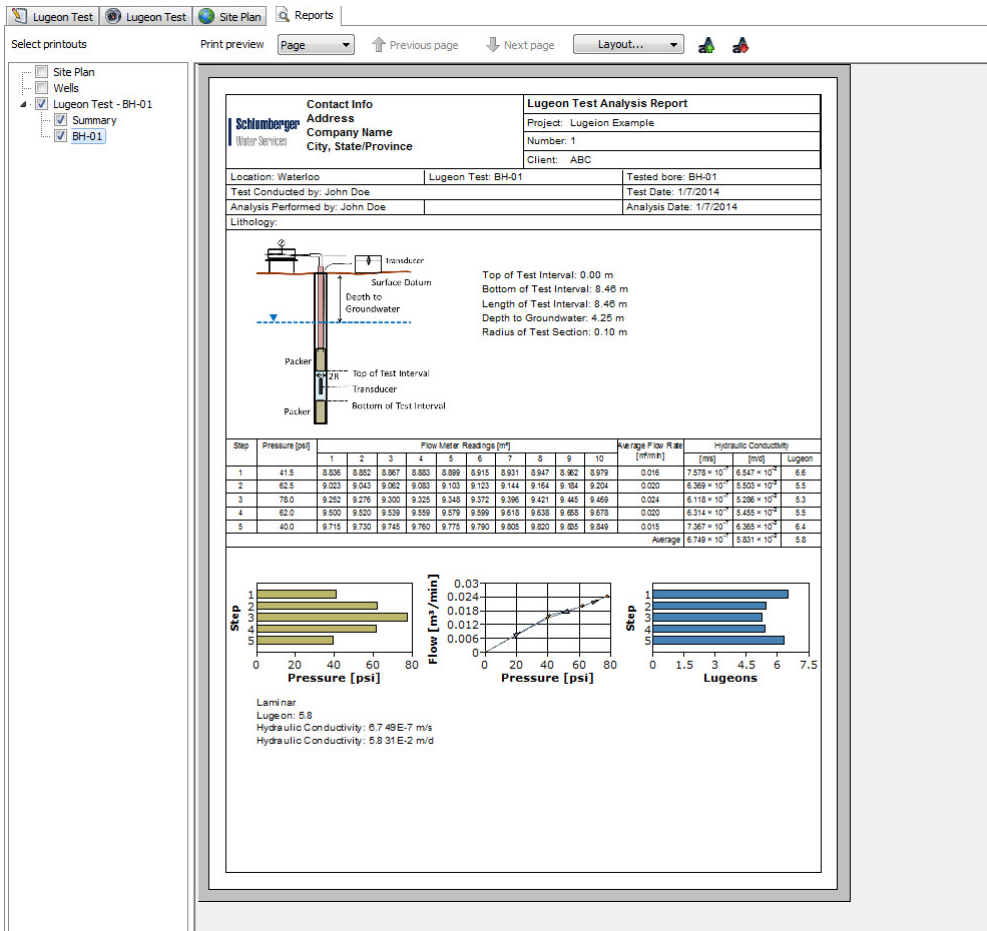
17. Click on the ▣ (**Print)** button in the tool bar, or select **File/Print** from the main menu. You may want to print to PDF, in which case, this option can be setup in the Tools/Options.

18. Save your project by clicking on the ▣ (Save) icon or selecting **File/Save** from the main menu.

This concludes the Lugeon Test exercise.

If you have any unresolved questions about **AquiferTest**, please feel free to contact us for further information:

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