



# PCPG

Pennsylvania Council of Professional Geologists  
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## ***More than a data table: Get More From Your Groundwater Data Using MS Excel***

**March 12, 2019**  
PSU Great Valley  
Malvern, PA

**April 9, 2019**  
Red Lion Hotel  
Harrisburg, PA

**April 30, 2019**  
Regional Learning Alliance  
Cranberry Township, PA

### **Proposed Program**

This course takes Excel beyond creating attractive report tables to accessing Excel's analytical power to help Geologists and Environmental Professionals explore groundwater data (levels, quality and pumping data) and more fully understand site conditions, remedial performance, and preparing effective graphics that support their findings and recommendations. The examples presented and practiced are intended to demonstrate approaches and tools for data evaluation, i.e., the methods used to evaluate water levels are also applicable to water quality, air samples, soil data, etc.

**7:30–8:00 Registration and Morning Refreshments**

**8:00–8:30 What More Can Excel Do For My Projects?**

Two case studies will be used as an introduction to the types of projects where Excel can be applied. Case studies address multiple well analysis of groundwater barrier wall effectiveness and how to visualize well casing and screen depths to assess flow zone characterization. A brief review of the types of data sets (spreadsheet versus database) and commonly used graphics like hydrographs and probability plots will be used to ensure all attendees share a common understanding of the examples used throughout the course.

**8:30–9:00 Pretty Report Tables Don't Add up**

Data tables may look good in a report but 9 out of 10 are unsuitable for data analysis. Blank spaces/columns for visual symmetry, cells with both alpha and numeric characters, confound the ability to calculate totals, averages or to graph data. This topic will use examples of good practice standards and habits for structuring tables for data analysis. Database vs Pivot (Crosstab) formats will be discussed.

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**9:00–10:00 Exercise: Sorting and Visualizing Water Levels in Multiple Wells or Flow Zones**  
The two initial case studies will be reviewed in detail followed by a hands-on exercise as practice for the techniques presented. Well casing and screen depths will be tabulated, filtered by attribute and water levels plotted to show wells either in or out of the same flow system. Water levels from multiple wells will be plotted and used to assess barrier wall performance.

**10:00–10:15 Break**

**10:15–11:15 Exercise: Starting with a Database Format to Create Pivot Tables for Data Analysis**  
Using pumping data from a typical public water supply (or recovery system well), a case study will be used to illustrate creating useful Pivot Tables. Excel's dynamic graphing function (Pivot Graphs) is used to clearly display and evaluate the data on a daily/monthly/annual basis, or inspect only individual wells. This will be followed by a hands-on exercise as practice for the techniques presented.

**11:15–12:00 Project Reality: Starting from Pivot Tables to Create a Database Format for Further Data Analysis**  
The public well pumping data presented in the previous session began with a database format spreadsheet. The database format is rarely available and must be created from multiple Pivot Tables, typically monthly reports. The process of creating the database is tedious but necessary. The process of changing monthly reports into a database will be demonstrated. This will be followed by a hands-on exercise as practice for the techniques presented.

**12:00–12:45 Lunch**

**12:45–2:00 Creating Spreadsheets to Investigate Hydraulic Relationships**  
A table of long-term groundwater level data will be used to create hydrographs and compare water levels in wells on different dates. Discussion of what to expect from wells (i.e., a conceptual site model) will be included. Given a CSM, how does one spot and support outlier data? Using the water level spreadsheet, we will use Excel's OFFSET() and Sliders functions to create interactive graphs. This will be followed by a hands-on exercise as practice for the techniques presented.

**2:00–2:15 Break**

**2:15 – 3:15 Inspecting Water Quality Data for Trends/Patterns**  
This session includes investigating water quality data distributions using cumulative frequency plots, probability plots, histograms, and fitting trend lines to data. This will be followed by a hands-on exercise as practice for the techniques presented.

**3:15–4:00 Questions and Answers**

The attendees will have an opportunity to ask questions regarding the Excel tools or individual project applications, or the analysis methods presented. As appropriate, the data sets presented during the day will be used to illustrate the answer(s) within the context of attendees' specific project questions. If no questions are asked, the following section will be expanded.

**4:00–4:30 Other Useful Tools for Processing Data**

There are hundreds of Excel tools that can be useful in groundwater science but cannot be covered in one class. This session will briefly address several important tools not used in the previous spreadsheets. Topics include, as time allows: VLOOKUP(), Moving Averages, Sorting, Conditional Formatting, User-Defined Functions, e.g., W(u).

**4:30 Completion of Course Evaluation, Sign-Out, Pick Up Certificate of Attendance**

**About our Presenter**

**Steven Sayko, P.G. (Services Environmental, Inc.)** - Mr. Sayko is a hydrogeologist with 31 years of experience in environmental consulting. He holds an AAS degree in Mechanical Technology, a BS in physics and an MS in Geology. His years of experience and education have culminated in a dynamic and innovative company that provides creative solutions to complex environmental problems. He has experience with RCRA, CERCLA and State-lead projects working for private industry, and has served the legal community in both the public and private sectors. His most important contribution to every project is effective communication of data analyses and site conditions - including the Conceptual Site Model (CSM).

Mr. Sayko's project experience includes numerous geologic/hydrogeologic/environmental investigations; peer review of reports, data analyses, and groundwater models; developing CSMs; groundwater flow and transport modeling; volatilization modeling; remedial design and performance evaluation; developing strategies to optimize the performance of remediation systems; and negotiating with PRP groups and agencies. He has also prepared expert reports and testified for the State of New Jersey in Natural Resources Damages cases and for NoMound® innovative onsite septic systems.