



# Modeling and Analysis with Groundwater Vistas

This hands-on course will review the underlying assumptions, theories, and practical utilization of numerical flow models. The fundamental underpinnings of the course revolve around conceptually modeling ground-water flow and the application of the Groundwater Vistas software. Students will work examples applying this software to coal mining and reclamation related analysis.

**Duration: 3 days**

**Course Code: HGV**



## TOPICS COVERED

### Review of Scientific Theory

- ▼ Geology Aquifer, Aquitard, Aquiclude
  - ◇ *Confined, Unconfined, Porosity*
  - ◇ *Fractures and Structures Permeability*
- ▼ Basic Ground—Water Hydrology
  - ◇ *Darcy's Law, Hydrologic Balance*
  - ◇ *Equilibrium Versus Nonequilibrium*
  - ◇ *Homogeneous Versus Heterogeneous*
  - ◇ *Anisotropic Versus Isotropic*
  - ◇ *De-pressurizing*
- ▼ Basic Modeling
  - ◇ *Numerical modeling, Types of models*
  - ◇ *Inverse versus forward modeling*
  - ◇ *Transient versus equilibrium*

### Groundwater Vistas Software Use

- ▼ Types of Numerical Models/Solutions
- ▼ Finite Difference, Finite Element
- ▼ Diffusion Equation, Grids, Layers
- ▼ Initial Conditions, Dimensionality
- ▼ Space Discretization, Boundary Conditions
- ▼ Water Budget Error, Error Criteria
- ▼ Steady—State Case Analysis
  - ◇ *Site Description, Conceptual Model*
  - ◇ *Building the Model, Run Model*
  - ◇ *Calibration, Sensitivity Analysis*
  - ◇ *Model Adjustment*
  - ◇ *Model Output Analysis, Interpreting Results Validation*

### Reviewing Permitting Information done by Models

- ▼ Model Representation of Groundwater Systems
- ▼ Input Parameter Estimation
- ▼ Real World Coal Mining Case Study

**WHO SHOULD ATTEND:** Regulatory or AML scientists with degrees or college credit in hydrology, or current experience in ground-water hydrology, with six months to one year of experience with SMCRA.

**COURSE PRE-REQUISITES:** Prospective students should possess a working knowledge of terminology including hydraulic conductivity, storativity, transmissivity, and Darcy's law. Prospective students should have also successfully completed the NTPP course Quantitative Hydrogeology. **Class size is limited to 12–17 students, depending on location.**