

HYDROGEOLOGY SERVICES

OUR HYDROGEOLOGICAL EXPERTISE

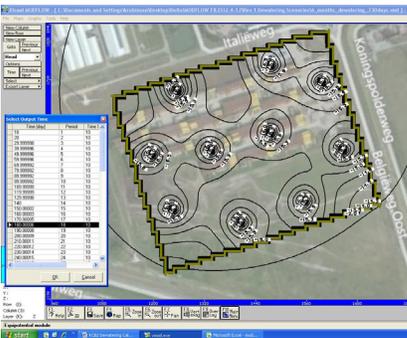
RIZZO International, Inc. provides expert hydrogeological services that include field-based site investigations, long-term groundwater elevation and groundwater quality monitoring, aquifer testing, and numerical groundwater modeling, as



well as surface water elevation measurements, surface water quality surveys, and stream flow measurements. Data from these hydrogeological investigations are used to describe local and regional groundwater and surface water conditions and characteristics, and to provide evaluation of the

potential impacts of power generation, infrastructure, dam, and mining operations on aquifers and surface water bodies.

Our hydrogeologists use Visual MODFLOW® Flex, RT3D, PHREEQC, MT3D, MODPATH, BIOPLUME III, and other open



source software to simulate and graphically present modeling results for groundwater flow, hydraulic controls, excavation dewatering, solute transport, contaminant biodegradation, and various other transport-related reactions.

Frequently, RIZZO's hydrogeological investigations integrate comprehensive geological surveys, as well as geotechnical and structural engineering assessments.

KEY SERVICES

RIZZO's key hydrogeological services include, but are not limited to:

- Contaminant Migration Modeling and Radionuclide Transport Modeling
- Dewatering System Design
- Groundwater Physical and Chemical Characterization
- Groundwater Monitoring and Sampling
- Groundwater Reserve Assessments
- Groundwater-Surface Water Interaction Assessments
- Hydraulic Analyses
- Hydroclimatological Studies
- Hydrogeological Hazard Evaluations
- Modeling and Impact Analysis For Construction Dewatering
- Monitoring Well Network Design and Installation
- Numerical Flow Modeling
- Packer, Pump, and Slug Testing
- Seepage Analyses
- Spatial Analytical (GIS-Based) Hydrogeological Investigations
- Surface Water Quality and Quantity Assessments
- Water Supply Well Siting and Feasibility Studies

RIZZO has provided hydrogeological services to project owners, designers, and regulators in the power generation, dams and water resources, infrastructure, environmental, and mining markets.

FEATURED HYDROGEOLOGY PROJECTS

BELL BEND NUCLEAR POWER PLANT – HYDROGEOLOGICAL INVESTIGATIONS (PENNSYLVANIA)



RIZZO completed detailed site characterization and subsurface investigations to support the license application for the proposed Bell Bend Nuclear Power Plant in east-central Pennsylvania. Field investigations included monitoring well installation, slug

and pumping tests, groundwater level measurements, groundwater and surface water quality surveys, and stream flow measurements. Collected data were used to characterize groundwater dynamics and environmental conditions at the site, and evaluate potential construction and power plant operational impacts on surface water bodies and groundwater aquifers.

SMITHLAND HYDROELECTRIC FACILITY – DEWATERING DESIGN (KENTUCKY)



RIZZO designed the excavation and associated deep well dewatering system for the Smithland Hydroelectric Power Plant Facility currently under construction on the Ohio River in Kentucky. To support the design, RIZZO conducted pumping

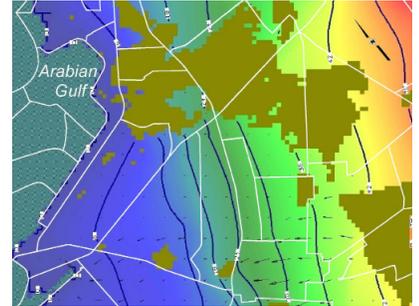
tests at the anticipated dam site. Data obtained during the tests were then used by RIZZO to develop two- and three-dimensional seepage analyses for various dewatering system designs.

RIO CHICAMA BASIN – HYDROGEOLOGY STUDY (PERU)

RIZZO developed and calibrated an integrated surface and groundwater model for a proposed mine site near Sayapulpo, Peru, in the Upper Rio Chicama Basin. Specifically, RIZZO's hydrogeological model was used to identify and evaluate alternate locations for mine operation leach pads and tailings ponds, and to model potential contaminant migration.

ABU DHABI MUNICIPALITY GEOHAZARD STUDIES – HYDROGEOLOGIC HAZARD STUDIES (UAE)

RIZZO developed a conceptual hydrogeological model and numerical groundwater flow model for a 1,400 square kilometer area in Abu Dhabi that was used in part to evaluate possible groundwater system conditions that contribute to surface subsidence and damage to buildings and infrastructure. RIZZO accumulated substantial data archives related to hydrogeological conditions across the region, including information on hydraulic properties, potentiometric surfaces, and groundwater recharge and discharge. Data obtained were used to assess hydrogeologic unit characteristics, and to advance the models for groundwater dynamics.



SHALE GAS DEVELOPMENT AND SURFACE WATER QUALITY ANALYSIS (PENNSYLVANIA)

RIZZO completed statistical, spatial, and time series (trend) analyses for surface water quality chemical data maintained in an academic consortium database, and evaluated potential evidence for unconventional shale gas exploration and production development impacts on surface waters in Pennsylvania. As a supplement to the statistical data analyses, RIZZO also completed a data quality assessment and error identification analyses.

VALLE DE CASABLANCA WATERSHED – HYDROGEOLOGY STUDIES (CHILE)

RIZZO produced a coupled surface water and groundwater model for the Estero Casablanca watershed in the Valle de Casablanca, an important viticulture region in central Chile. In developing the model, RIZZO completed a GIS-based land-use assessment, and geophysical investigations designed to further characterize subsurface conditions. RIZZO also inventoried more than 450 private and municipal wells in the Estero Casablanca drainage area, and gathered information on groundwater use in order to model aquifer drawdown.