

An Introduction to Groundwater Issues at Mine Sites

Produced by:

R.V. Nicholson, Ph.D.



Topic 10: Groundwater Evaluation



Groundwater Evaluation

Define the objectives

- Baseline flow / quality condition
- Environmental Assessment
- Groundwater pathways / flow direction and receptors if contamination occurs
- Dewatering rates / water level during operations
- Assess resource potential
- Monitoring as an early indicator
- Identification of suspected contaminants
- Mitigation plan
- Closure planning / rehabilitation



Baseline Flow and Quality Environmental Assessment

- Topography / surface hydrology review
- Geological review / stratigraphy
- Hydrogeology
 - Define water table
 - Flow directions (horizontal and vertical)
 - Collect samples for analysis
 - Measure hydraulic conductivities in single wells
 - Approximate rates of flows
 - Identify receptors and impact areas

Groundwater Pathways

- Basic hydrogeology
- Flow modelling
 - Define directions
 - Quantities

Dewatering / Resource Assessment

- Focus on local area and depth of mine or wells
- Pumping tests required
- Flow modelling may be useful

Monitoring

- Flow system must be defined
- Estimate flow rates and arrival times based on flow system (to develop “model” behaviour)
- Monitoring wells installed in stages over time
- Complement with other methods (geophysics)

Identify Contamination

- Define flow system
- Geophysics may be appropriate (conductivity contrast)
- Estimate travel times / arrival times
- Long well screens or hole intervals initially
- Plan in phases

Mitigation / Closure Planning

- Define flow system and contaminant zones
- Estimate flow rates / timing of breakthrough etc. (flow/transport modelling may be helpful)
- Establish monitoring network including receptors
- Implement mitigation