

AWRA

Water Quality and Water Management at Hard Rock Mines

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Water Quality Standards

- Protected uses (Drinking, Aquatic Life, Human Health, Recreation, Agriculture, Industrial)
- Most stringent applies
- Narrative standards “May not cause detrimental effects on indicated use.”
- Numeric standards “Arsenic, 10 µg/L”.
- Found in 18 AAC 70 and “Toxics Manual”

Baseline Data

- Surface and groundwater quality and quantity
- ML/ARD prediction – ABA and humidity cells
- Aquatic life
- Needed for water quality standards, design, operation, and closure

Surface Water Monitoring

Red Dog Sampling at Station 10



Groundwater Monitoring

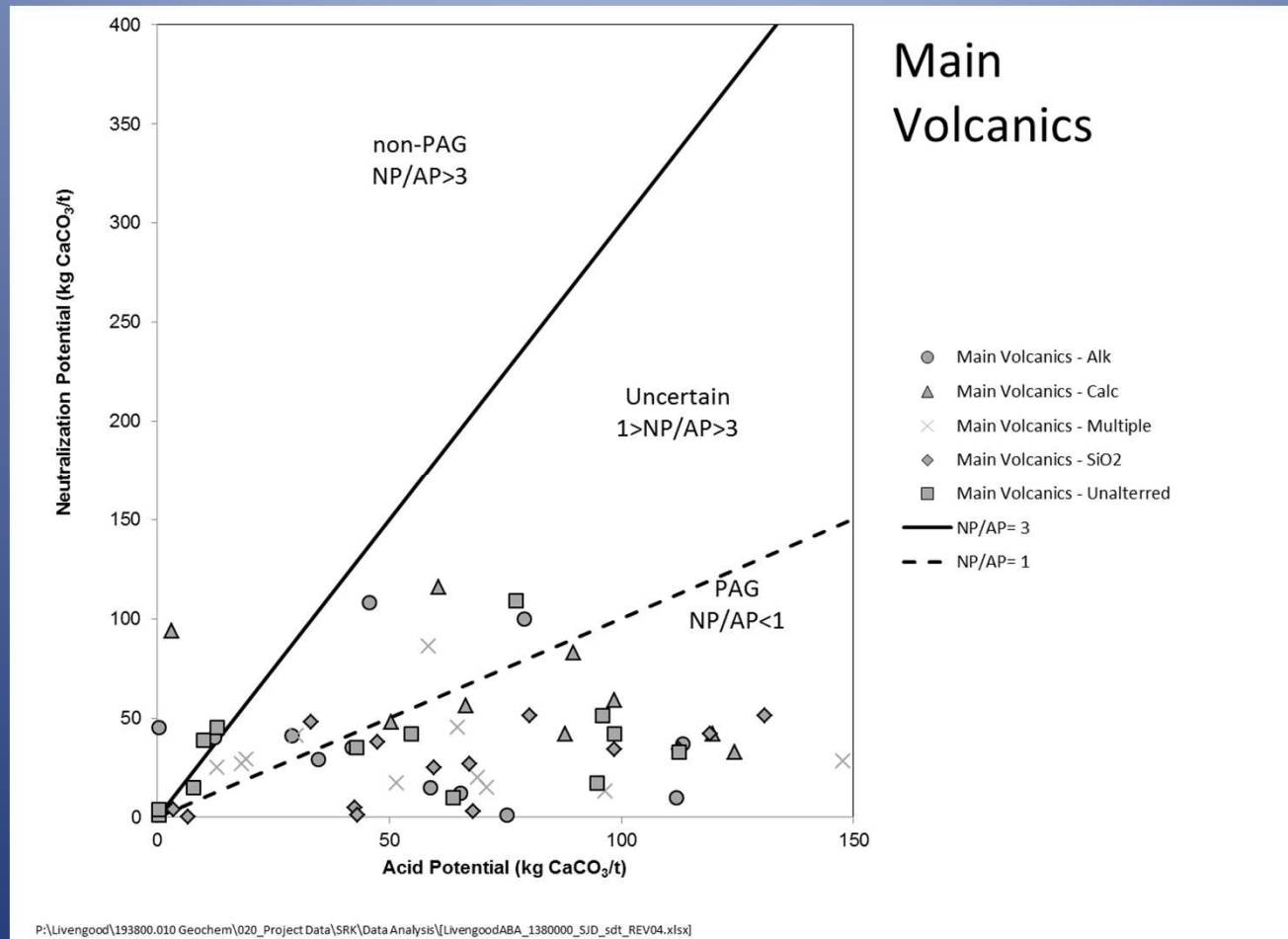
Ft. Knox Monitoring well 7



Rock Creek TSF MW06-9A & 9B

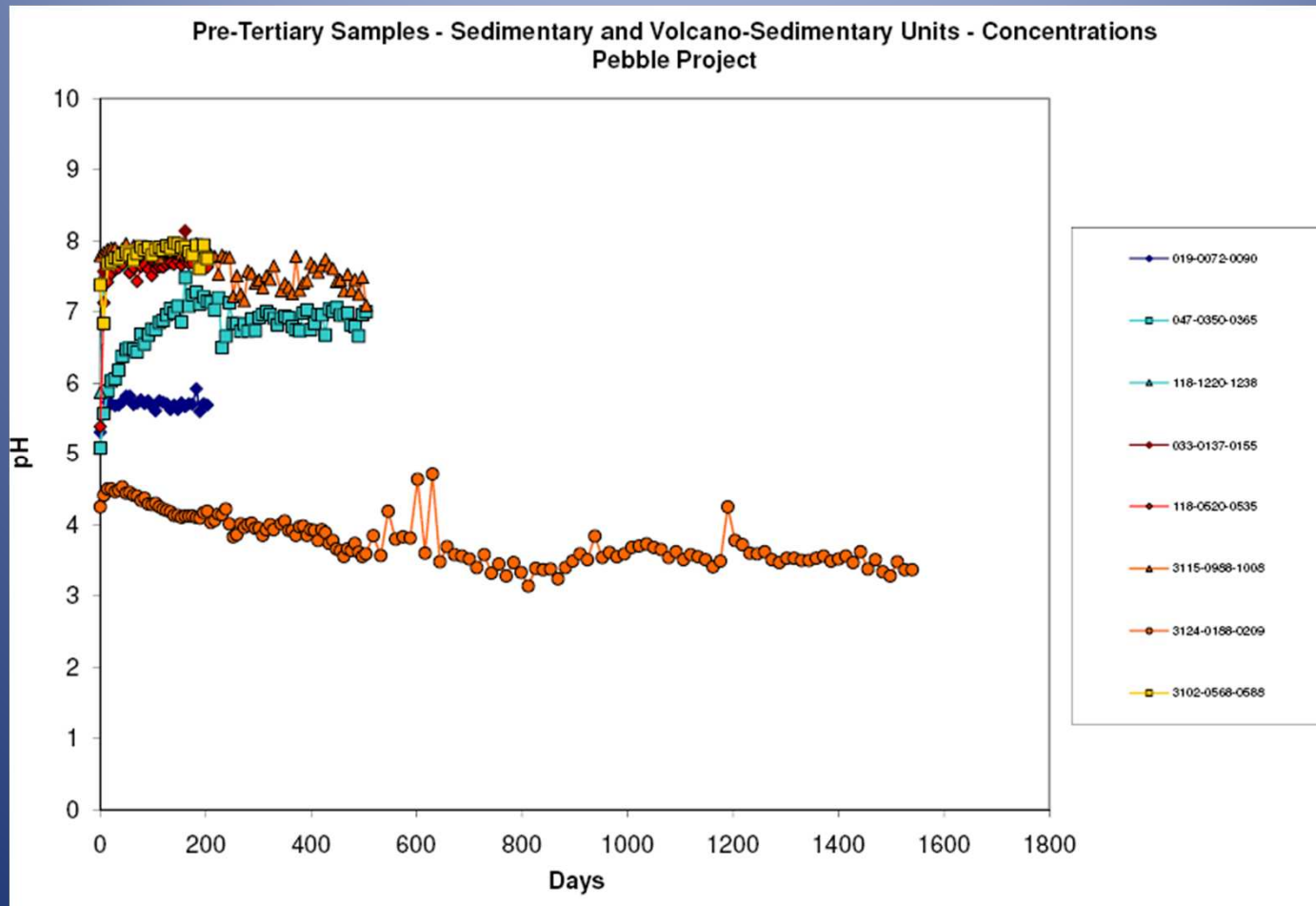


Example ABA data



Example Humidity Cell Data

Pebble



Sources of Water at Mines

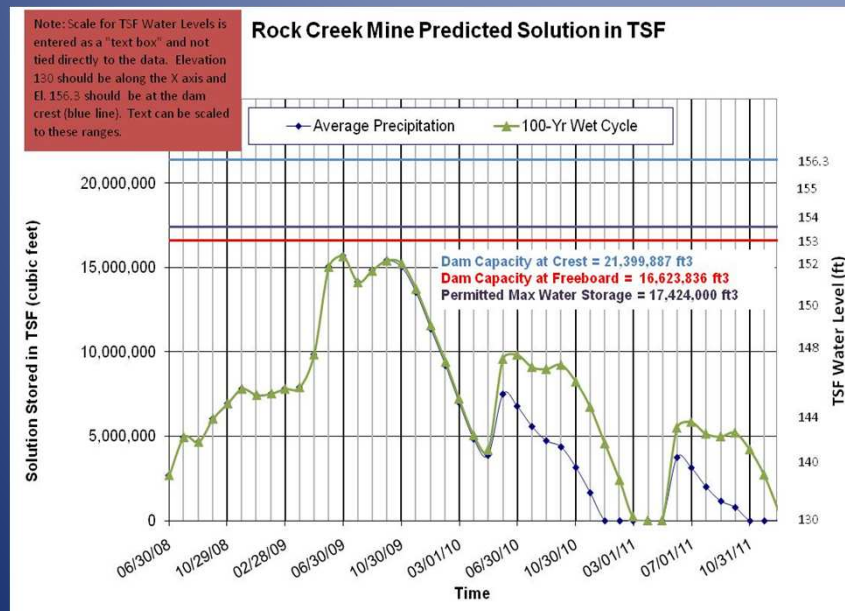
- Diverted water (storm water)
- Dewatering Water (pit or underground)
- Process water
- Tailings pore water
- Recycled water
- Discharged water
- ARD Waste/Production Rock drainage

Water and Load Balances

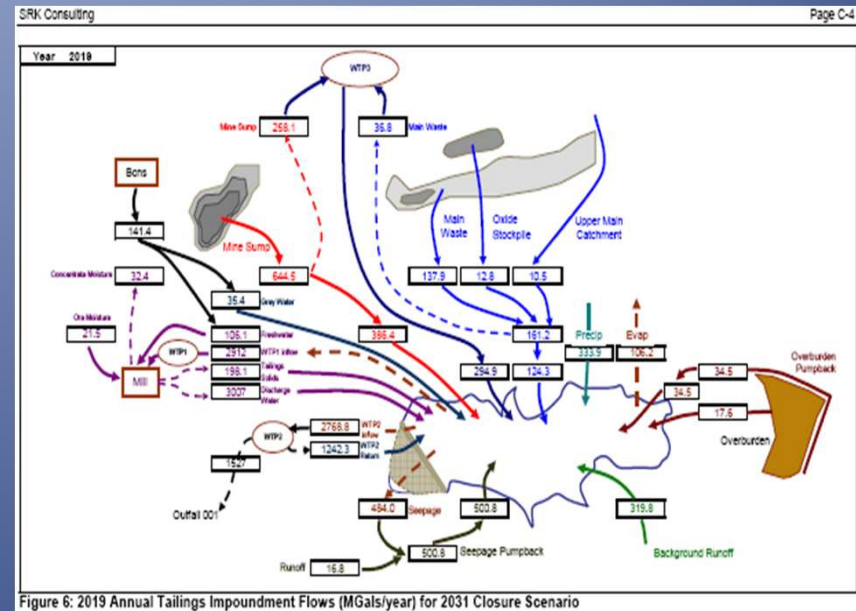
- Important for predicting and managing water during operation and at closure
- Stored water (dams, tanks, liners, treatment requirements, etc)
- NSPS net precipitation limit (40 CFR 440 Subpart J)

Water Balance Examples

Rock Creek over time



Red Dog snapshot in time



APDES/Waste Management Permits

- Effluent limits
- Mixing zones
- Monitoring
- Antidegradation
- Reclamation and closure plan
- Long term water treatment
- Financial assurance

Monitoring Plans Support Permits

- Surface water
- Groundwater
- Biologic

Examples of Water Management at Several Mines

Red Dog Mine



Dirty and Clean water Bypass



Dirty Water Bypass



Clean Water Bypass



Dirty Water Pumps to TSF



Treated Water Outfall to Red Dog Creek



Fish Weir



Greens Creek Camp



Tailings with Pond 7



Pond 7



Tails Dry Stack



Site 23 Waste Rock



Pond D below Site 23



Fort Knox Mine



Fork Knox Pit



Walter Creek Heap Leach



Seepage Interceptor Location



Fort Knox Water Reservoir



Water Reservoir Spillway



Kensington Mine



Lower and Upper Slate Lakes



Intake to Diversion Pipe



Kensington Tailings Dam



Bypass and Effluent Around Dam



East Fork Slate Creek



Pogo Mine



Dry Stack Tails



Recycle Water Pond



Seepage Collection Wells Below RWP



Part of Off River Treatment Works



Goodpaster River and ORTW Outfall



Treated Sewage Outfall



Rock Creek Mine



Diversion Channel Maintenance



Rock Creek DC1



DC1 Outfall



Spring Runoff Under Road



Injection Wells and Heat Trace



Rock Creek Land Application



The End