Maximizing Abandoned Mine Cleanups with Limited Resources at the Upper Tenmile Creek Mining Area Superfund Site, Helena, Montana

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Presentation Outline

- Brief history/background
- Describe challenges and solutions
  - Prioritize remediation efforts
  - Community involvement
  - Coordinate remediation efforts
  - Reuse of onsite materials
  - Use of passive treatment systems
- Summary
Brief History / Background

- NPL site - 53 square mile watershed
- Provides up to 80 percent of Helena’s water
- First priority to address human health risk
- Over 150 mine sites (hard rock) and 100 residential yards
- Currently addressing mine sites
  - 28 remediated to date (after 2015)
  - 54 mine sites remaining
- Evaluate and design acid mine drainage source controls and treatment
Brief History / Background (cont.)

- **1999 and 2014:** Luttrell Repository (old open pit mine) and WTP constructed and expanded
- **1999 – 2015:** Remedial actions at major sites (525,000 CY)
- **2003 – 2015:** 66 residential yard remediation (90,000 CY)
Unique Project Site

Elk
*Cervus canadensis*

Black Bear
*Ursus americanus*

Tenmile cultural resource specialist
*Homo sapiens*
Challenge #1: Large watershed with widely dispersed contaminated legacy mine sites and residential properties

- 150 known mine sites
- Difficult to determine priorities
- Needed strategic plan
- Address human health risk first
- Multiple adit discharges flow into Helena’s water supply
Solution #1: Develop site-specific mine site risk-weighted prioritization system/program for addressing solid media

Risk categories included:
1. Contaminant concentrations
2. Exposure accessibility
3. Evidence of contaminant mobility
4. Eco-receptors
Challenge #2: Property owners were skeptical /hostile of remediation program

- Majority of residential yards impacted by mining-related contamination
- Septic systems
- Arsenic (30,000 ppm) and lead (25,000 ppm)
Solution #2: Provide multiple channels and layers of community outreach

- Agency participation in watershed group
- Community meetings and events
- Informational flyers
- Patience and respect
- Strategy for exit
Challenge #3: Stakeholders have overlapping management goals for site

- Shared management of the Luttrell regional waste repository
- High elevation and steep, single lane haul roads
- Watershed enhancement projects
Solution #3: Develop and coordinate synergies that allow for efficient use of resources

- Annual coordination meeting
- Coordinate remediation and enhancement projects
- Real time/ongoing project forecasts
- Periodic construction/management meetings with stakeholders
- Transparent collaboration
Challenge #4: Finding cost-efficient clean backfill for areas where contaminated media are removed

- Imported clean material from off site
- 50 mile roundtrip
- Trucks ran empty for half of the trips
- Truck travel through communities
Solution #4: Reuse/development of suitable borrow sources to reduce cost and impact of importing backfill

- Blasting/reuse of onsite materials
- Crushing and screening operations
- Fuel and cost savings
- Social benefit
Challenge #5: Over 30 measurable acid mine discharge point sources

- 75-85 percent of metals loading
- Located at remote locations
- No access from November to June
- Limited or no access to power
Solution #5: Determine suitability and effectiveness of passive treatment technologies for reducing acid mine discharge loading

- 4-phase source control program
- Operate
  - *Biochemical reactors*
  - *Successive alkalinity producing systems*
- Monitor and lessons learned
Wrapping it Up!

Winter cover on the Luttrell repository

Hydro-mulch at the Lee Mountain mine site
Summary

- Determine priorities early in the project lifecycle
- Have clear and united message
- Coordinate and meet with all agencies to achieve multiple site goals
- Develop sustainability plan to save project costs
- Consider the use of passive treatment systems for treating acid mine drainage