Snowmaking as a Viable Groundwater Disposal Method at the Butte Highlands Mine

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Mine Design, Operations, & Closure Conference
May 4, 2011
Organization

- Project Overview
- Water Overview
- Hydrologic Modeling
- Snowmaking
Project Overview
Project Overview

- Seven Patented Claims
- Highland Mining District
  - Fish Creek Discovery – 1866
  - Highland Mine – 1930’s
  - Modern Exploration – 1980’s
  - Butte Highlands Mine - 2010
Property Ownership

- Butte Highlands Joint Venture (BHJV)
  - 50/50 JV
    - Timberline Resources
    - Highland Mining Company

- Small Mine Development, LLC (SMD)
  - Operator/Contractor
Permitting

- DEQ Approved Exploration Permit
  - Site Preparation
  - Underground Development (drill stations)
  - Drilling
  - 10,000 ton Bulk Sample
- Operating Permit Submitted
Project Overview

- Surface
  - Shops/Offices
  - Batch Plant
  - Pump Houses/Core Shed
  - Ponds
    - Settling/Containment
  - Land Application Disposal (LAD)
Project Overview

- **Underground**
  - January 2010
  - Over 4,500’ of Drift
  - 4 U/G Drill Stations
Project Overview

- ≈ 50,000’ of Core
- Estimated Completion Date
  - June 2011
Design vs. As-Built

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Grouting

- Main Decline
- Upper Access Ramp (UAR)
  - 846,000 lbs of cement
  - 59.5 days – 7 tons/day
- Effective but Costly
  - Time Consuming

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Pump Stations

- Sump #3 – 34 gpm
- Re-circulating 20 gpm
Current Water Handling

- Monitoring Wells
  - 2 Surface
  - 5 Underground
  - Sampled Monthly
Hydrology Test
Hydrology Test

Purpose

- Model Underground Aquifer
  - Determine De-watering Pumping Rates
  - Placement of De-watering Wells
  - Model Surface Water Impacts

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De-watering Pump

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Hydrology Test

- Step Test
- Constant Pump Test
  - 350 gpm
  - 10 Days

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Snowmaking
Construction
Nov 6, 2010

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Snowmaker Pumps

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Pipe
- 6” Poly = 2,300’
- 8” Steel = 2,300’
- 3” Steel = 950’

Electrical Cable (480 v)
- 350 MCM = 1,450’
- 4/0 = 1,600’
SMI Super Pole Cat Snowmaker

- Tower Mounted
- Fan + Compressor: 35 hp
- Water Pressure: 100 – 750 psi
- 30 nozzles: 22 – 142 gpm
  - 5 Valve Banks
- 360 Degree Rotation
- 70 Degree Oscillation

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Snowmaking

- 7 Snow Makers
  - ≈ 250’ Spacing
  - Prevailing Wind
- For 350 gpm
  - Utilized 5 Guns @ ¼ Capacity
Pump Test Data

- Jan 18 – Jan 28, 2011
- Total Water Pumped = 5,240,679 gallons
Challenges

- Pumping System
- Learning Curve
- Weather Dependant
- Labor Intensive
Lessons

- Hire Professionals
- Space Requirements
  - Placement of Snowmakers
- Expect Time

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Conclusion

- Snowmaking is a Viable Solution for Water Disposal at the Butte Highlands Mine

- Limitations:
  - Snow Melt
  - Space
  - Weather Dependant
  - Cost (capital & labor)
Questions?