Montana Bureau of Mines and Geology

Butte Mine Flooding Monitoring

East Camp System

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Montana Bureau of Mines and Geology
“the Bureau”

...a non-regulatory research agency within the MUS and the state geological survey

~65 professionals & staff, ~20 students...

Butte – MT Tech
Billings – MT Tech
(on MSU-Billings campus)
How Did We Get Here?

High Ore Pump Station 2800

Kelley Pump Station 3900
Monitoring Program

Watching the water...
This illustration depicts bedrock groundwater levels in the Berkeley Pit and underground mine workings beneath Butte. It shows how the Pit is at the center of a large “cone of depression” which works like a big sink that draws water toward it. Water level measurements, shown as elevations (in feet) above sea level, help us understand the complex nature of the underground water system.

What is the current water level of the Pit?
As of April 2008, the Berkeley Pit's water level was 5,393.26 feet above sea level. The water level climbed to a record high of 5,393.36 feet in late spring 2008. Since June 1998, when PitWatch was first published, the water has risen about 112 feet.

Graphic and photos available at: www.pitwatch.org
East Camp System

- Alluvial groundwater within the active mine site.
- Bedrock groundwater, including abandoned underground mines.
- Berkeley Pit, Horseshoe Bend, and Continental Pit (not monitored during active mining).
Alluvial Monitoring Network
Alluvial Network

• 22 wells within the active mine area
• 16 wells outside the active mine area
• 2 nested well pairs within mine area
• 3 nested well pairs outside mine area
• Hourly water-level monitoring in 21 wells
Long-Term Trends in Alluvial Wells
East Camp Bedrock Network

- 11 bedrock wells within the active mine area
- 4 bedrock wells outside the active mine area
- 6 mine shafts
- Hourly water-level monitoring in 10 wells
Bedrock Monitoring Network
• Critical Water Level (CWL) is based on lowest point in the Butte Basin, location where Silver Bow Creek exists the basin, Ranchland Packing and where I-90 crosses creek.
• Established 9 Points of Compliance (POC)
• 4 mine shafts
• 5 bedrock wells
• Water-levels cannot exceed CWL at any of the POC’s, therefore, pit always the lowest point.
Points of Compliance Sites

- Anselmo Mine
- Granite Mountain Mine
- Kelley Mine
- Pilot Butte Mine
- Belmont Well #2
- Bedrock Well A
- Bedrock Well C
- Bedrock Well G
- Sarsfield Well
Points of Compliance Vs. Berkeley Pit
Comparison Elevations

• Elevation at 5 Mile Bar- 5562’
• Elevation at Butte Country Club- 5505’
• Elevation at Butte Plaza Mall- 5472’
• Civic Center- 5469’
• Courthouse- 5761’
• Elevation at Chamber of Commerce- 5459’
• Lowest point of Berkeley Pit rim- 5510’
• Alluvial Water-Level Elevation at Rim – 5450’
• Elevation of Pit water that would reverse gradient - 5460’
The Berkeley Pit will never overflow.

Approx. 5410' level
Dec 2012 water level
5306'
Berkeley Pit Long-Term Trend

- Critical Water Level
- Lowest Elevation of Pit Rim
- Berkeley Pit Landslide
- Horseshoe Bend Water Diverted to Yankee Doodle Tailings Dam
- Horseshoe Bend Water Diverted to Pit
- Horseshoe Bend Water Treatment Plant On-Line
- Feb 2013 Landslide

Date Range: July 1991 to July 2013

Water-Level Elevation (ft)

Y-axis: 4950, 5000, 5050, 5100, 5150, 5200, 5250, 5300, 5350, 5400, 5450, 5500, 5550

Recent Berkeley Pit Landslide Transducer Data-February 2013

Well G, ~2800 ft from pit edge

Well DDH-2, ~2220 ft from pit edge

Well J, ~660 ft from pit edge
Berkeley Pit CWL Projections, Based on Anselmo Mine Water-Levles (July 2023)
Data Reporting Requirements

Monthly

Open-File Reports

Annual

Open-File Reports Available online at:

www mbmg mtech edu
All Data Available on GWIC

All BMFOU data available online at: mbmggwic.mtech.edu