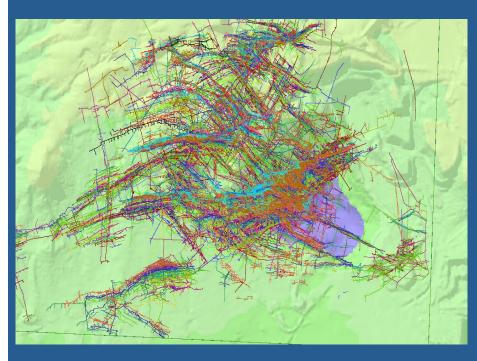
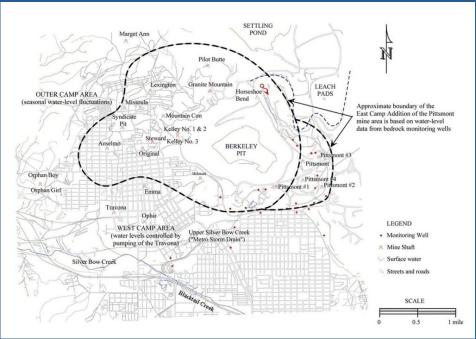
#### Montana Bureau of Mines and Geology

# Butte Mine Flooding Monitoring East Camp System

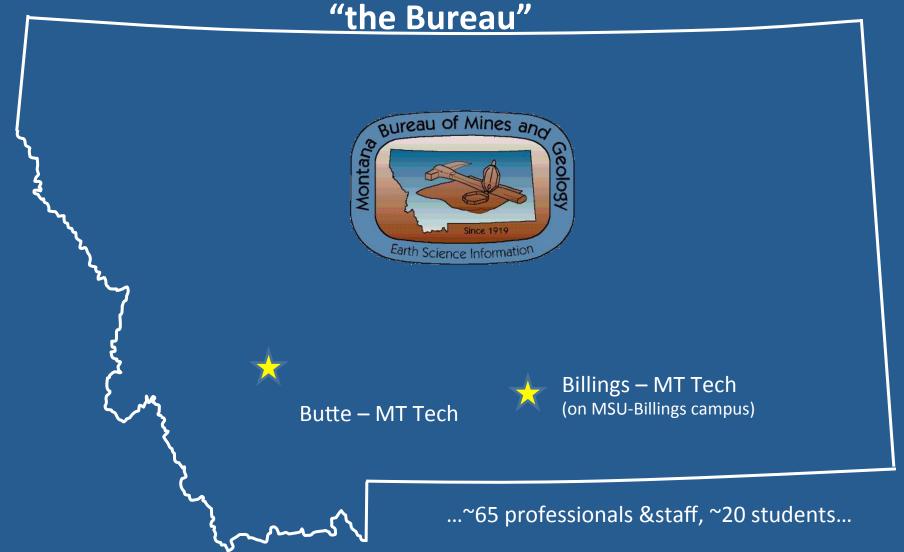




Nicholas J. Tucci March 19, 2013

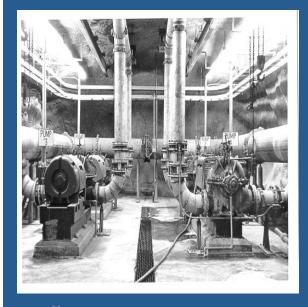


## Montana Bureau of Mines and Geology "the Bureau"



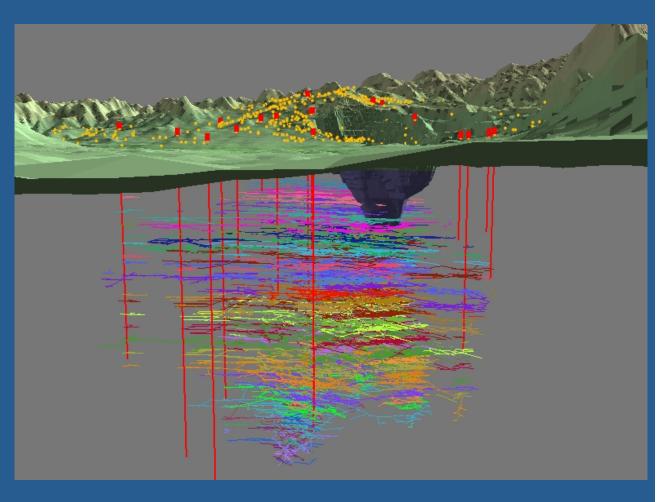
...a non-regulatory research agency within the MUS and the state geological survey

**High Ore Pump Station 2800** 

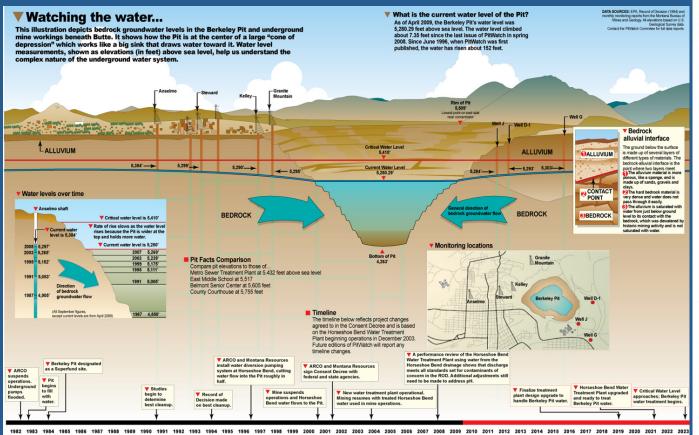


**Kelley Pump Station 3900** 

#### How Did We Get Here?



### **Monitoring Program**



Graphic and photos available at: www.pitwatch.org





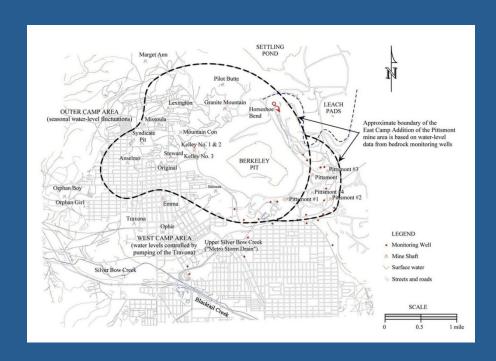




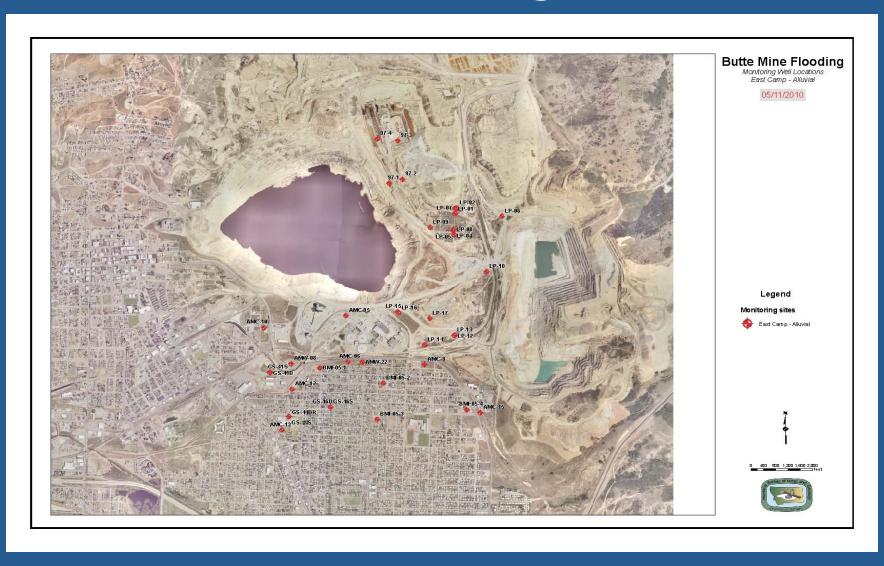


#### East Camp System

- 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



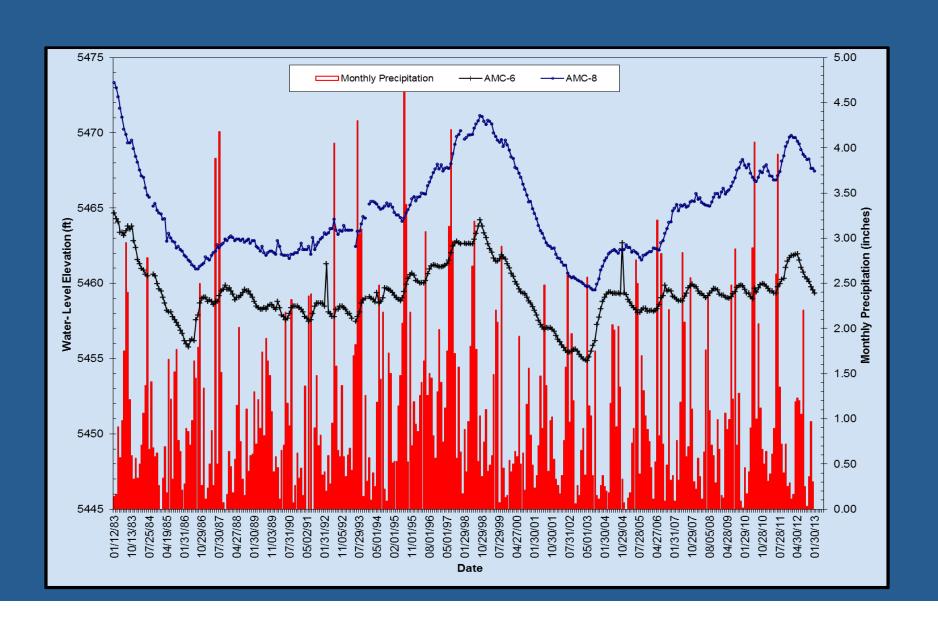
#### Alluvial Network

- 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

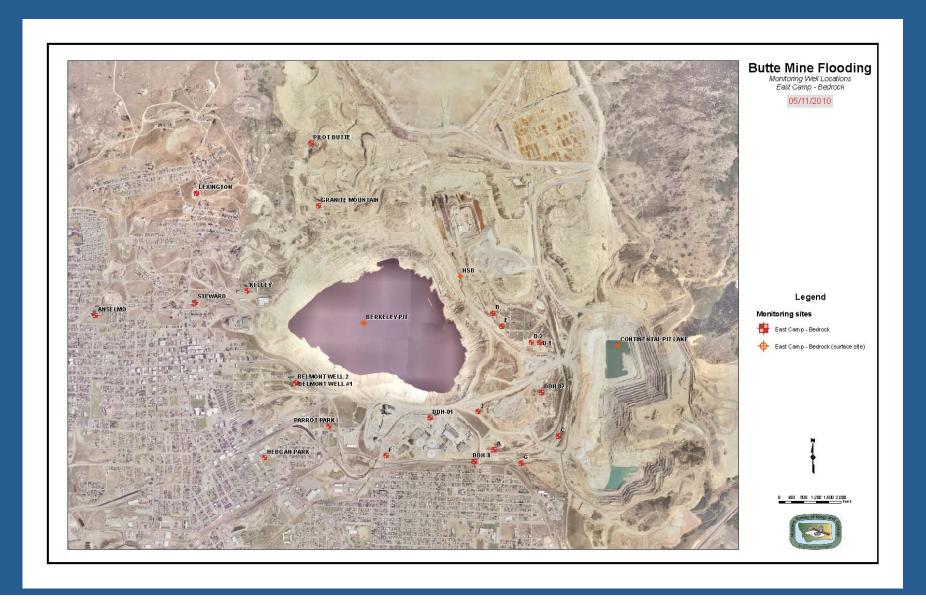
11 bedrock wells within the active mine area

4 bedrock wells outside the active mine area

6 mine shafts

Hourly water-level monitoring in 10 wells

### Bedrock Monitoring Network

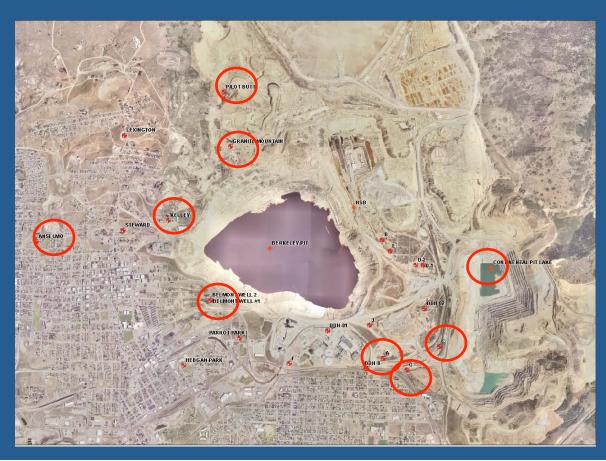


# East Camp Bedrock Critical Water Level-Elevation 5410, USGS

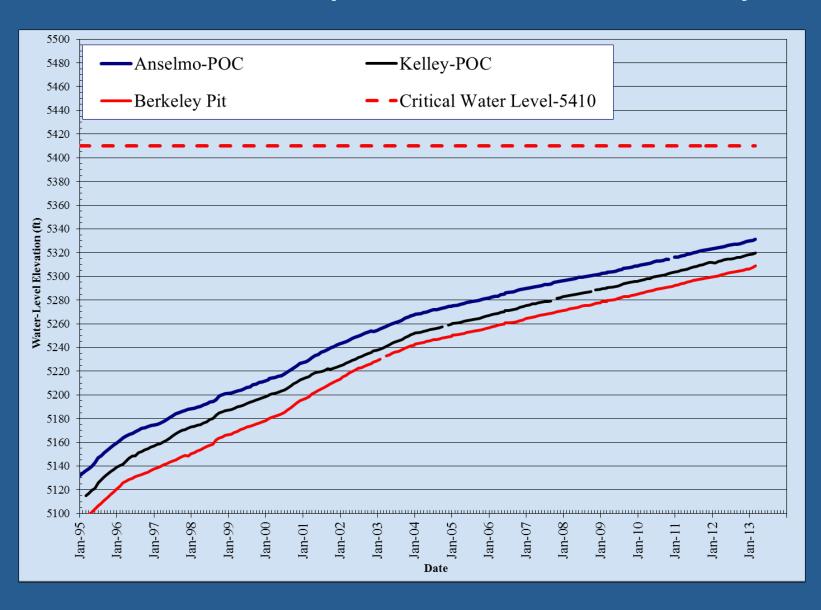
- Critical Water Level (CWL) is based on lowest point in the Butte Basin, location where Silver Bow Creek exists the basin, Ranchland Packing and where I-90 crosses creek.
- Established 9 Points of Compliance (POC)
- 4 mine shafts
- 5 bedrock wells
- Water-levels cannot exceed CWL at any of the POC's, 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

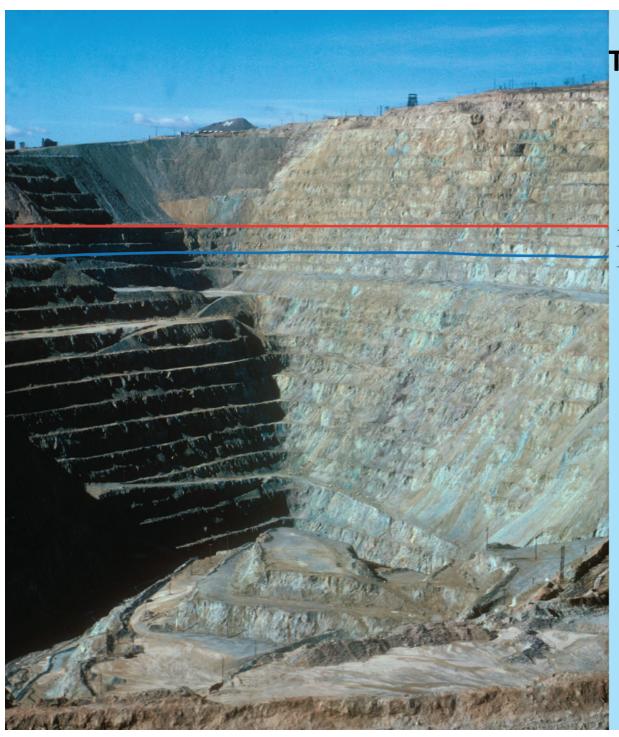


#### Points of Compliance Vs. Berkeley Pit



#### **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'

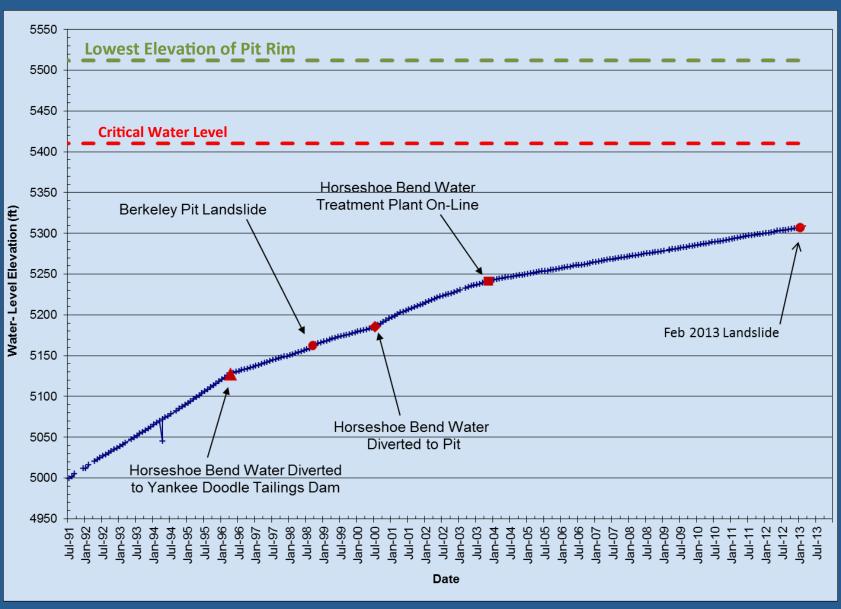


## The Berkeley Pit will never overflow

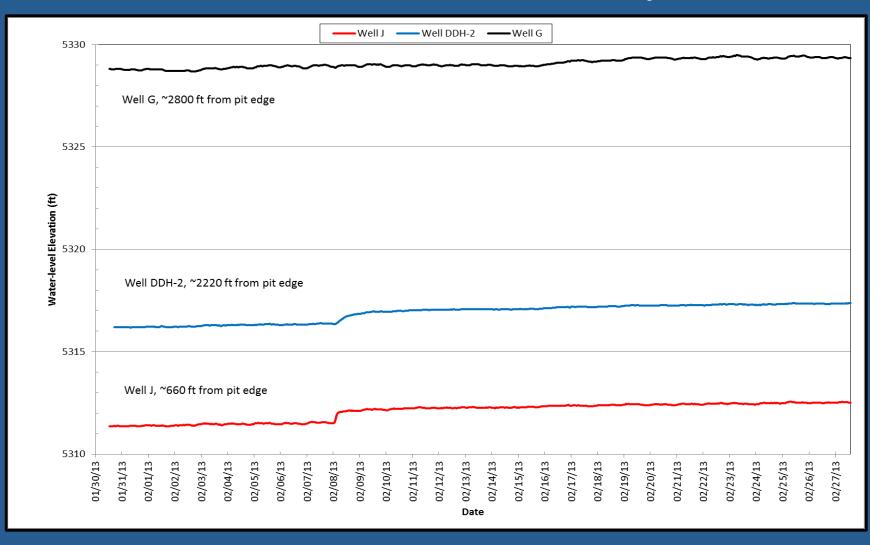
Approx. 5410' level Dec 2012 water level 5306'

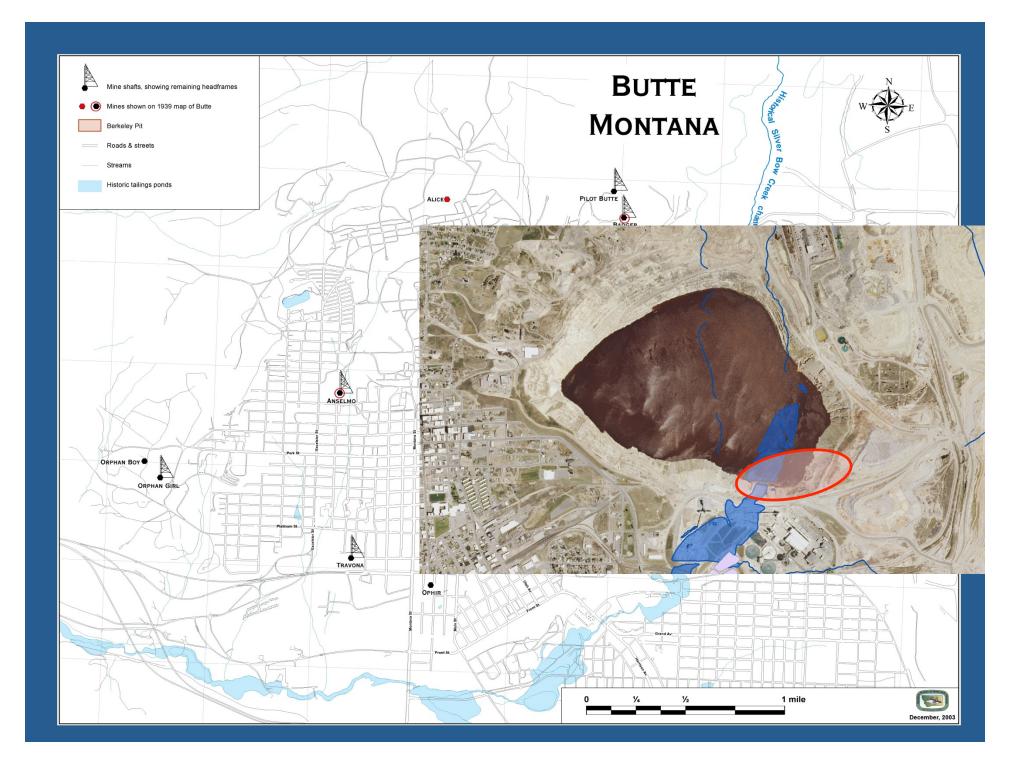


### Berkeley Pit Long-Term Trend

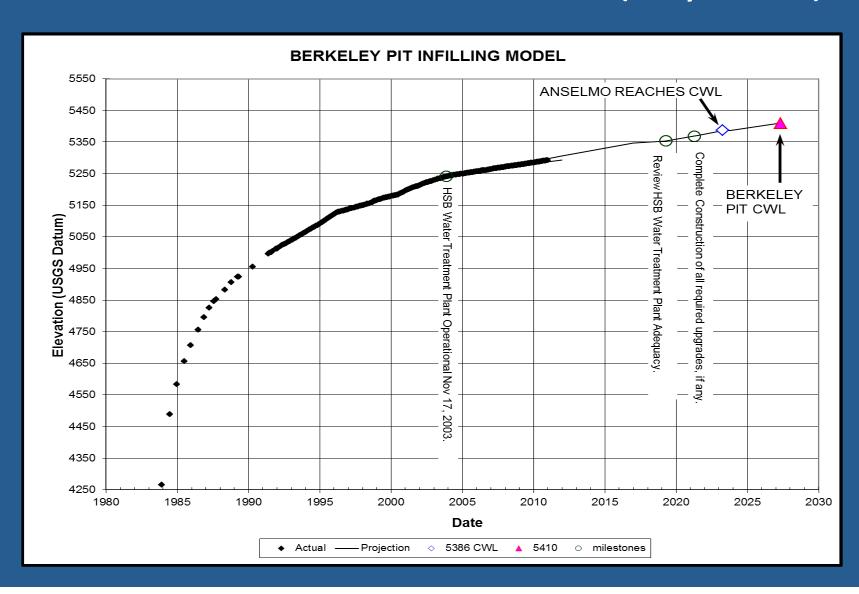


### Recent Berkeley Pit Landslide Transducer Data-February 2013





# Berkeley Pit CWL Projections, Based on Anselmo Mine Water-Levels (July 2023)



#### Data Reporting Requirements

#### **Annual**

#### Monthly

#### Montana Bureau of Mines and Geology

Montana Tech of The University of Montana



Daryl Reed, Hydrogeologist Montana Department of Environmental Quality 1100 North Last Chance Gulch P.O. Box 200901 Helena MT 59620-0901

RE: CONTRACT NO. 400022-TO-35, BUTTE MINE FLOODING – February 2013 MONTHLY REPORT, BMFOU CONSENT DECREE 02-35-BU-SEH

Dear Daryl

Enclosed is the February 2013 monthly report for Contract No. 400022-TO-35, Butte Mine Flooding CD Monitoring. This report is in partial fulfillment of the terms contained in the Butte Mine Flooding Operable Unit Consent Decree 02:35-BU-SEH. The enclosed report briefly discusses the major activities undertaken during the month and presents data from monitoring activities. A moderate landstide occurred in the southeast corner of the Berkeley Pit on February 4, 2013. The water level was re-surveyed on February 12, 2013; the water leveloul was 50:36.

The Berkeley Pit water level was surveyed by ATS Surveying and Engineering on March 6, 2013 and was at an elevation of 5,308.82 feet.

Figures referenced in the report are contained on the enclosed compact disk in a PDF file format. If you have questions about the project, or the enclosed report, do not hestate to contact me. Electronic copies of the report (let only) and water-level data have been sent to the involved parties, per Appendix C of the Consent Decree.

#### Sincerely,

Ted Duaime Hydrogeologist

Lip donce.

Lip de Company Com

Karen LaClair, TREC
Jon Sesso, BSB Courthouse
Tom Malloy, BSB Courthouse
Jim Jonas, Copper Erw.
Dan Powers, BSB Health Department
Rick Larson, BSB Public Works
Dan Dennelly, BSB Public Works
Bruce Evans, BSB Metro Sewer
Fritz Daily

Natural Resource Bidg I 1300 West Park Street I Butte, MT 59701-8997 I 406-496-4180 I www.mbmg.mtech.edu

#### Montana Bureau of Mines and Geology

Montana Tech of The University of Montana



#### February 21, 2013

Mr. Daryl Reed Montana Department of Environmental Quality 1100 North Last Chance Gulch P.O. Box 200901 Helena, MT 59620-0901

Ms. Sara Sparks Project Officer U.S. EPA Region 8 Federal Building #339 400 N. Main Street Butte, MT 59701

#### RE: SUMMARY REPORT 2012

Dear Daryl and Sara:

Enclosed is the summary of 2012 water-level changes, Horseshoe Bend flows, and water-chemistry data for the Butte Mine Flooding Project. The updated Berkeley Pit infilling model has been added to this year's report. This summary is part of the 2002 Consent Decre 02-35-BU-SEH. A more complete discussion of 2012 trends, etc. will be contained in the 2012 Annual Report.

The information is presented in a series of tables and graphs containing previous years and 2012 data. Do not hesitate to contact me if you have questions about any of the enclosed information.

#### Sincerel

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TD.pd
Enclosures
Enclo

Natural Resource Bidg I 1300 West Park Street | Butte, MT 59701-8997 | 406-496-4180 | www.mbmg.mtech.edu



#### **Open-File Reports**

Butte Mine Flooding Operable Unit

Water-Level Monitoring and Water-Quality Sampling

2011 Consent Decree Update

Butte, Montana

1982-2011

nmnamd fo

The Montana Department of Environmental Quality Remediation Division

U.S. Environmental Protection Agency



March 2012

Prepared by

and Nicholas J. Tucci
Montana Bureau of Mines and Geology
1300 West Park Street
Butte, MT 59701-8997
Contract No. 400022-TO-35

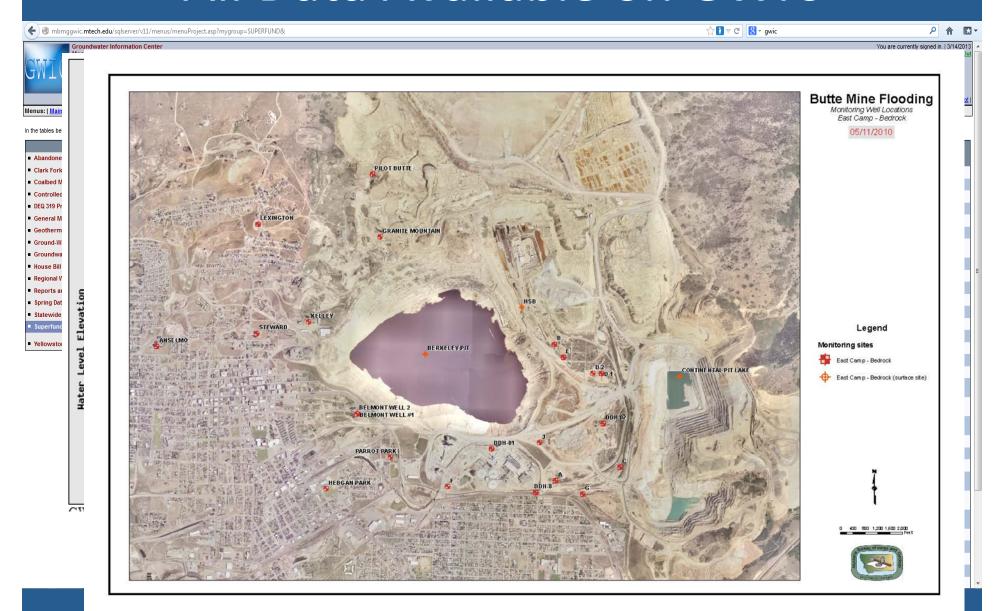
Montana Bureau of Mines and Geology

Open File Report 6XX

Open-File Reports Available online at:

www.mbmg.mtech.edu

### All Data Available on GWIC



### GWIC Mapper

