

# GROUNDWATER REPLACEMENT

Groundwater Injury  
Butte and Anaconda

# Montana v. ARCO

## 1999 Consent Decree

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- Montana Received \$144 M in NRD
- \$15 M for Assessment and Litigation Costs
- \$127 M for damages
- \$2 M in real property along Silver Bow Creek
- Plus \$86 M for Silver Bow Creek Remedy

# Restoration of “Injured Natural Resources and/or Lost Services”

## Natural Resources that:

- are owned, controlled, managed or held in trust by the State of Montana
- were injured by release of hazardous substances from ARCO or predecessor's mining and mineral processing operations
- were subject of Montana v. ARCO lawsuit

## Lost Services:

- physical and biological functions performed by a resource
- includes human use of those functions

# Lost Drinking Water Services



7 million gallons/day

# 10 Grant Cycles

## 2000 - 2010

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73 Large Grants approved for \$120 Million

- Anaconda-Deer Lodge = 17 for \$23.7 M
- Granite = 9 for \$1.2 M
- Missoula = 10 for \$7.5 M
- Powell = 14 for \$20.8 M
- Butte-Silver Bow = 23 for \$66.3 M



# Grant Projects in Silver Bow County

- 2001 - 10: Butte Water Lines = **\$17.4 M**
  - 2001 - 10: Silver Bow Creek Greenway = \$23.6 M
  - 2002 - 05: German Gulch Watershed = \$926 K
  - 2003: Basin Creek Dam = **\$503 K**
  - 2003 - 05: Duhamel Acquisition = \$1.67 M
  - 2004: High Service Tank = **\$1.19 M**
  - 2004 - 05: Big Butte Acquisition = \$688 K
  - 2007 - 10: Big Hole Transmission Line = **\$8.72 M**
  - 2007: Thompson Park = \$988 K
  - 2008: Big Hole Dam = **\$3.71 M**
  - 2008 - 10: Children's Fishing Pond = \$1.23 M
  - 2010: Big Hole Pump Station = **\$3.50 M**
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- Water = **\$35 M** in Butte and **\$14 M** in Anaconda

# 2012 UCFRB Restoration Plan

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## Groundwater = \$40 M

- Anaconda-Deer Lodge = \$10 M
- Butte-Silver Bow = \$30 M

## Aquatics = \$40 M

- Flow = \$20 M
- Tributary Restoration = \$20 M

## Terrestrial = \$18 M

## Recreation = \$6.5 M

# Montana v. ARCO

## 2008 Consent Decree

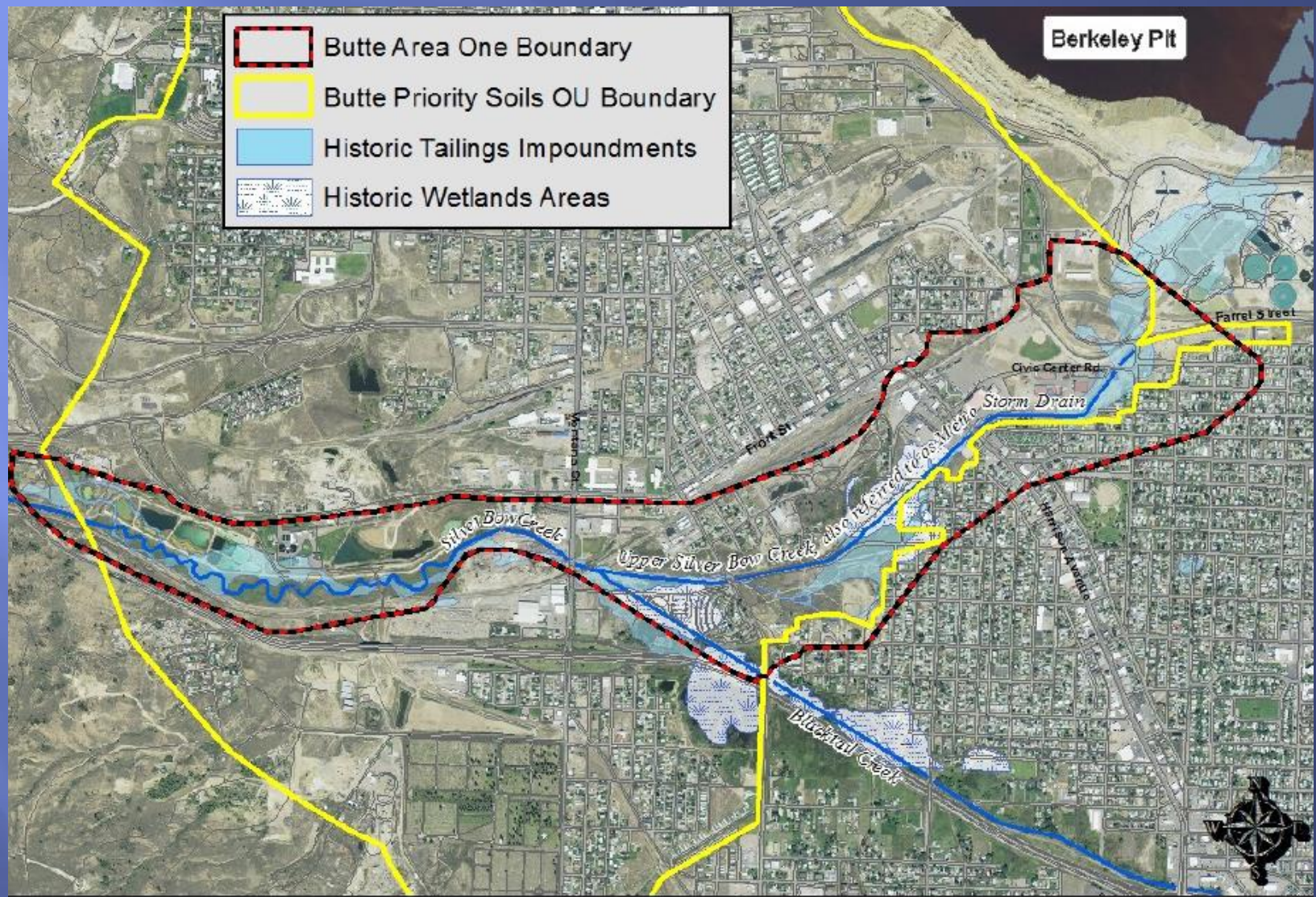
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### Montana Received \$72.5 Million in Oct. 2008

- \$4.5 M for Assessment and Litigation costs
- \$68.0 M for Natural Resource Damages
  - \$26.7 M for Clark Fork River
  - 13.3 M for Smelter Hill Uplands
  - \$28.0 M for Butte Area One
- Plus \$96.5 M for Clark Fork River Remedy
- Total: \$169 Million



# Butte Area One



**Figure 2. Butte Area One**

0 0.25 0.5 1 Miles

**BNRC**

# Butte Area One

## BNRC Recommendation Summary

Project Category	Category Allocation Total (\$)
Upper SBC Corridor Restoration	10,000,000
Mine Cap Improvements/Reveg	6,000,000
Stream Restoration	4,000,000
Water System Improvements	10,000,000
Storm Water	0
Recreation	1,000,000
Small/Miscellaneous Projects	1,000,000
Total	32,000,000



# MAP OF BUTTE CITY

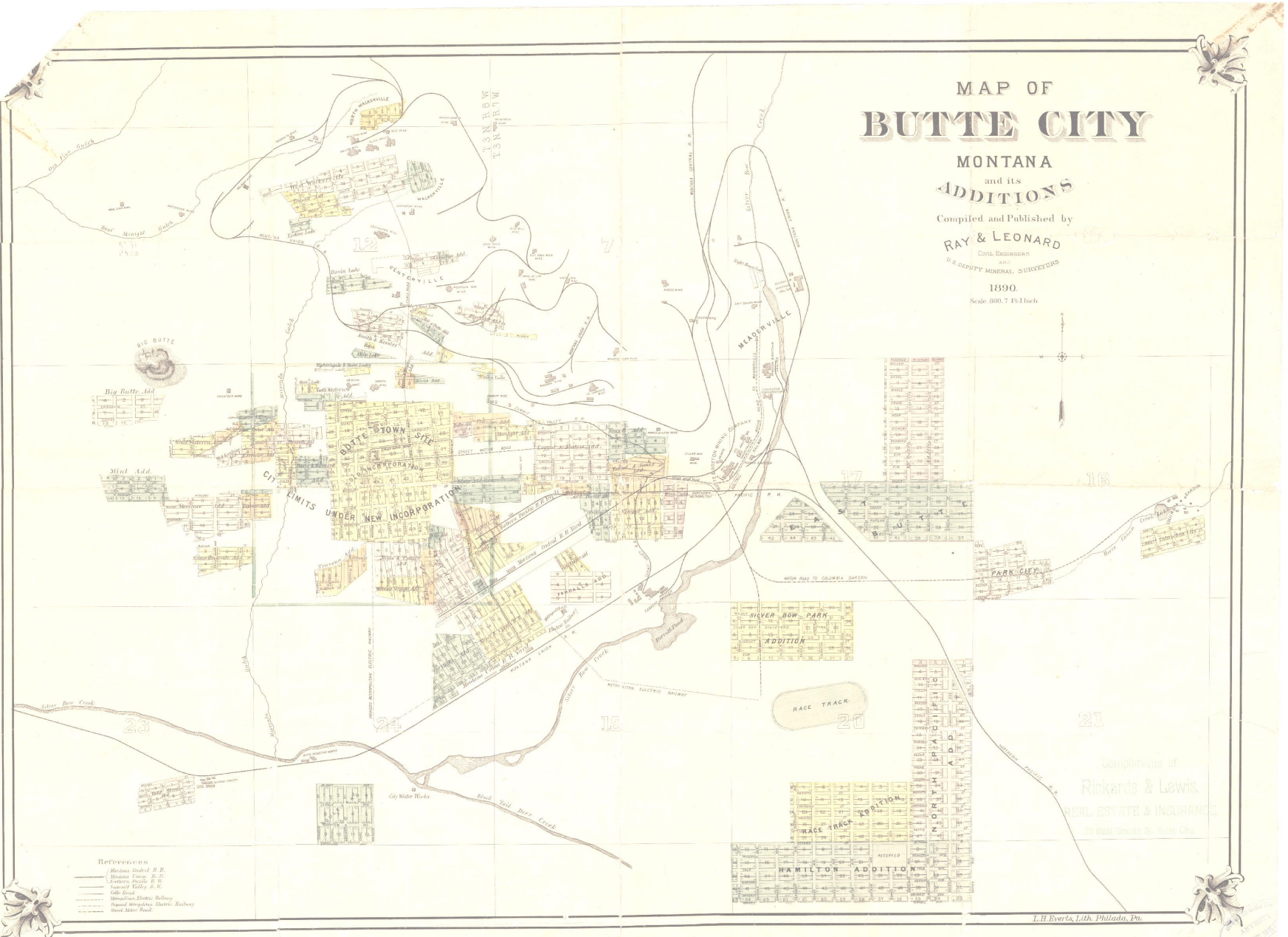
MONTANA  
and its  
ADDITIONS

Compiled and Published by

RAY & LEONARD  
CIVIL ENGINEERS  
AND  
U.S. DEPUTY MINERAL SURVEYORS

1890.

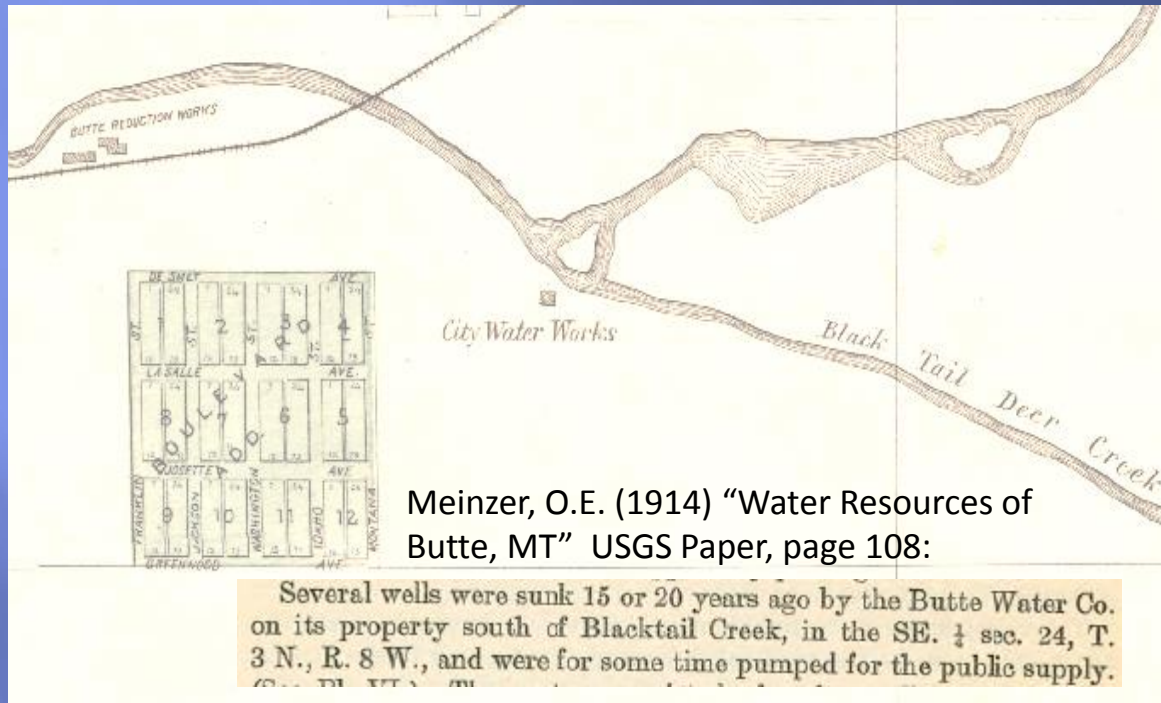
Scale 800.7 Feet to an Inch



1890 Sub-division Map of Butte City by Ray and Leonard Engineering

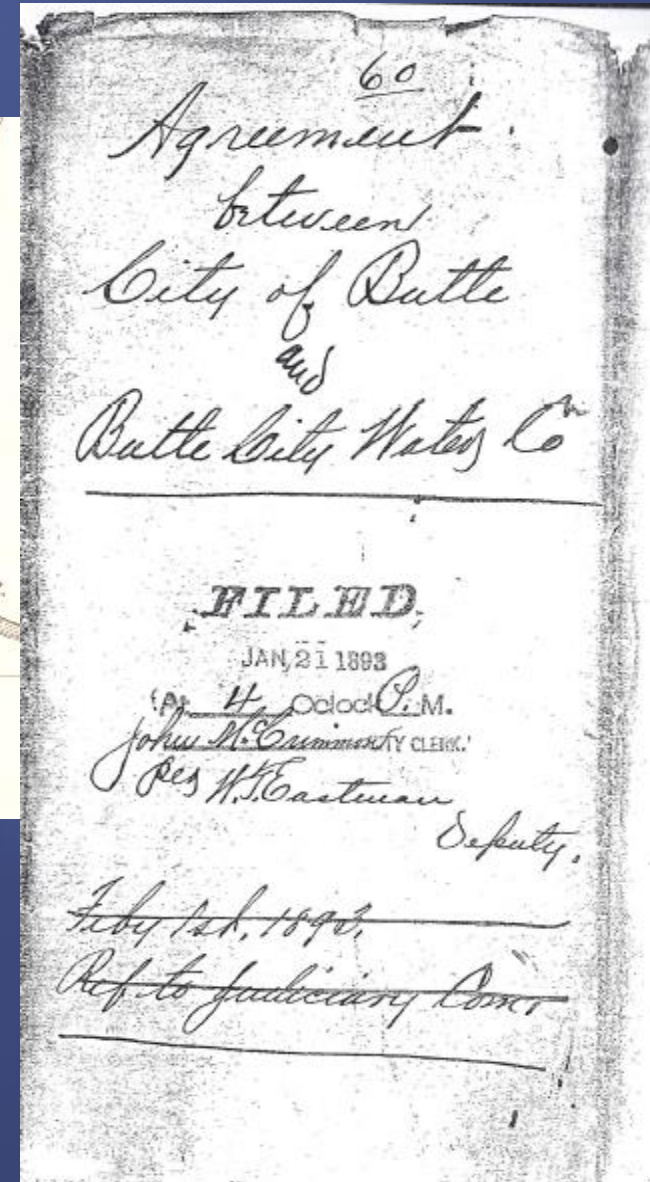


# Butte drank from its alluvial aquifer until 1893...



Meinzer, O.E. (1914) "Water Resources of Butte, MT" USGS Paper, page 108:

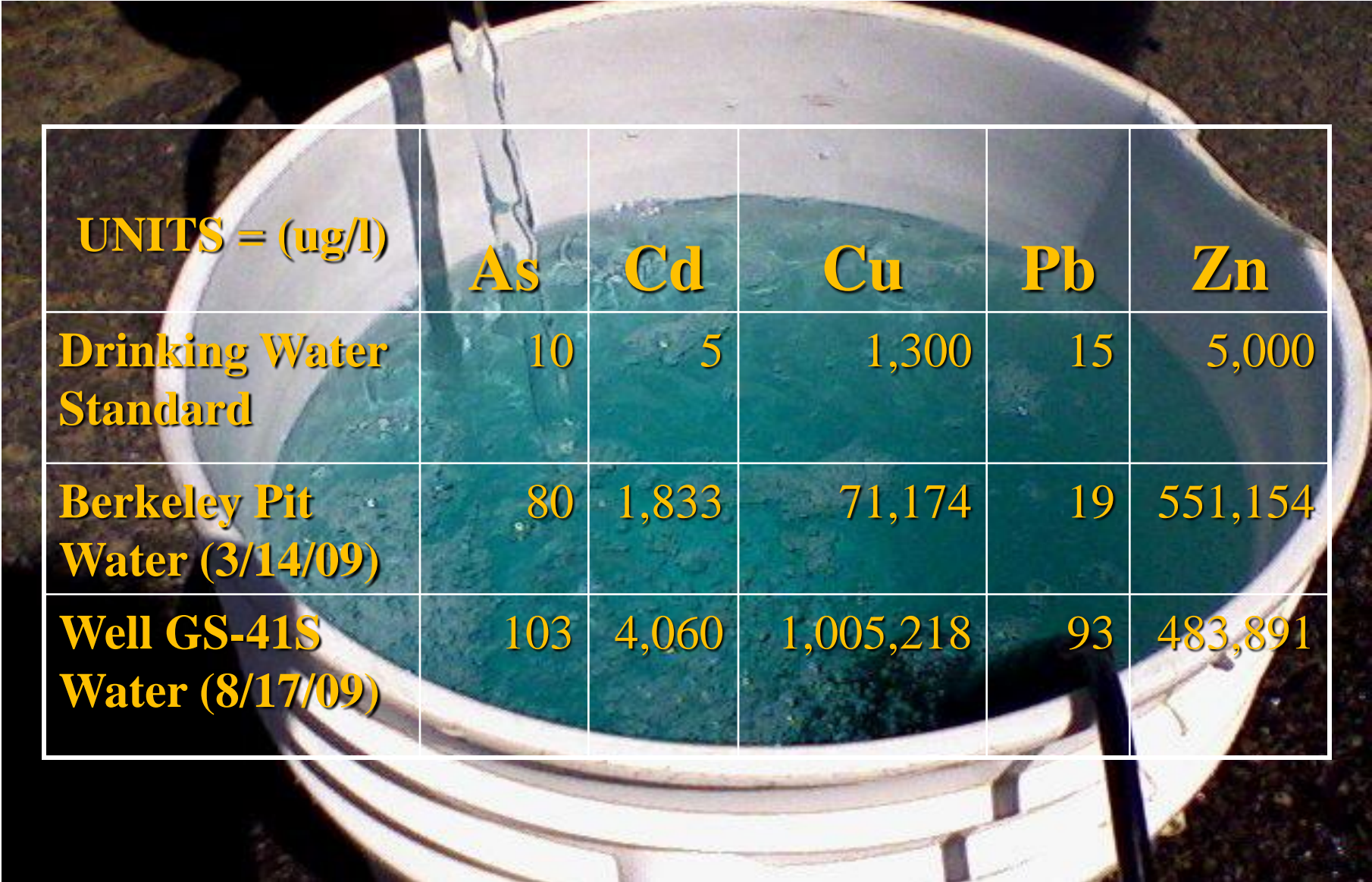
2006 BPSOU ROD: Table 12-11 on page 12-57:  
"Alluvial groundwater has not been used as municipal source in the past."





# Water Comparison

Drinking Water - Berkeley Pit - Parrot Tailings



<b>UNITS = (ug/l)</b>	<b>As</b>	<b>Cd</b>	<b>Cu</b>	<b>Pb</b>	<b>Zn</b>
<b>Drinking Water Standard</b>	10	5	1,300	15	5,000
<b>Berkeley Pit Water (3/14/09)</b>	80	1,833	71,174	19	551,154
<b>Well GS-41S Water (8/17/09)</b>	103	4,060	1,005,218	93	483,891

# Butte Groundwater Restoration Plans

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## 2012 Master Plan for \$6 M:

- Complete Big Hole Transmission Line

## 2013 Master Plan for \$24.1 M:

- Basin Creek Water Treatment Plant = \$20 M + \$10 M BAO
- Telemetry and Controls = \$467 K
- CO2 Feed at Big Hole WTP = \$182 K
- VFD and Soft Starts at Big Hole WTP = \$275 K
- Basin Creek-Colorado Hill Pump Station = \$1.59 M
- Water Meters = \$1.59 M
- 6 Other Components if funds available = \$8.3 M



# Old Big Hole Dam and Pump Station





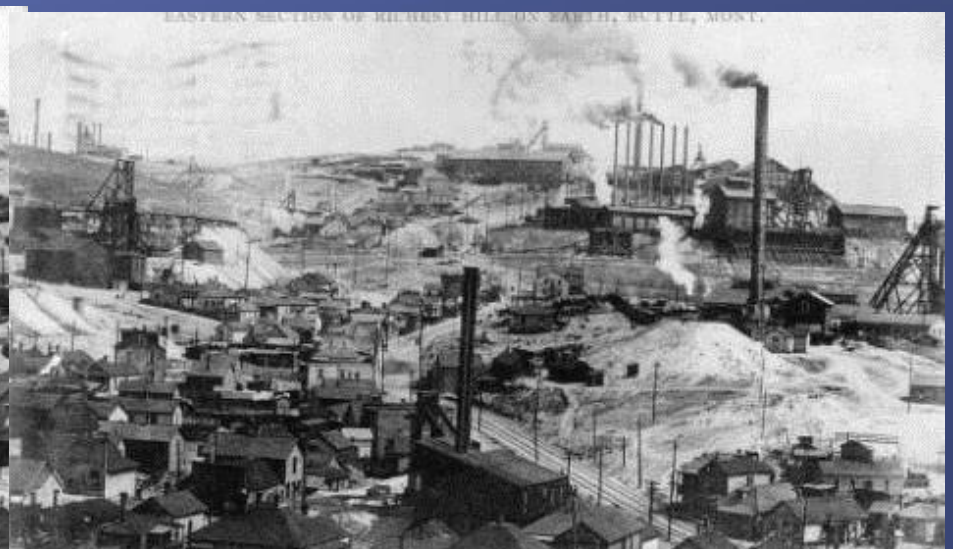
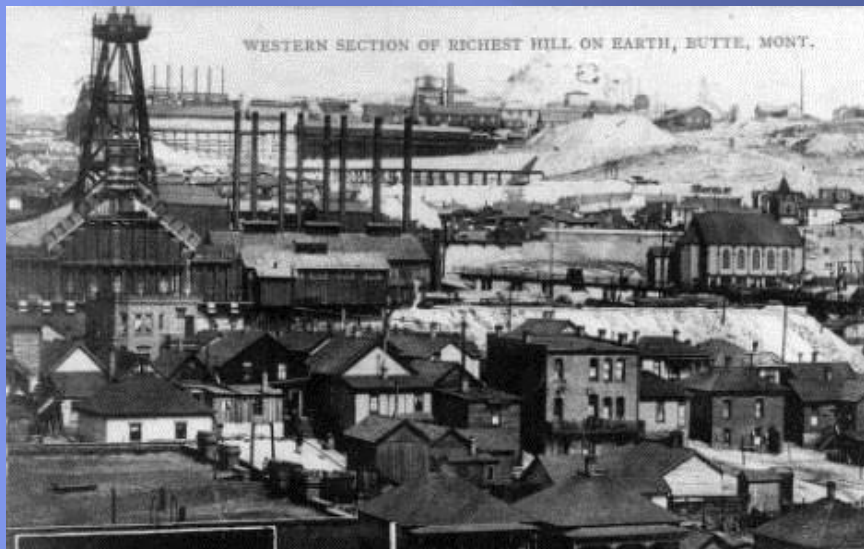




# Butte Tour Preview

OKAY,  
so, what happened in  
Butte, America?

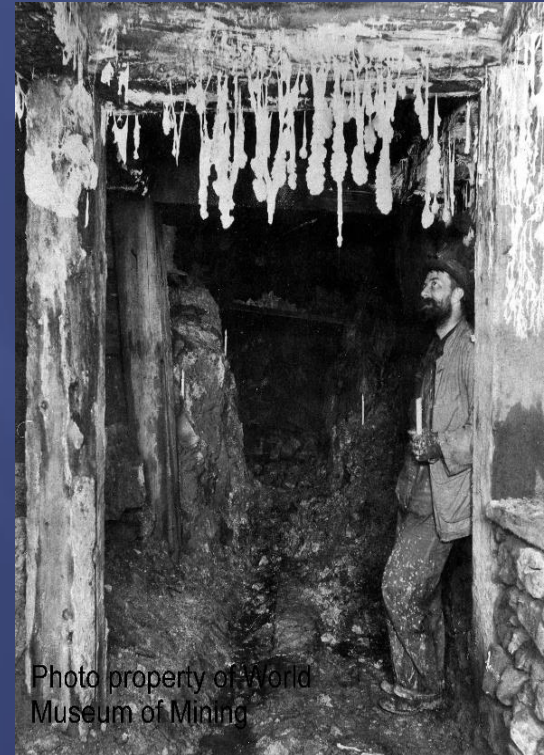
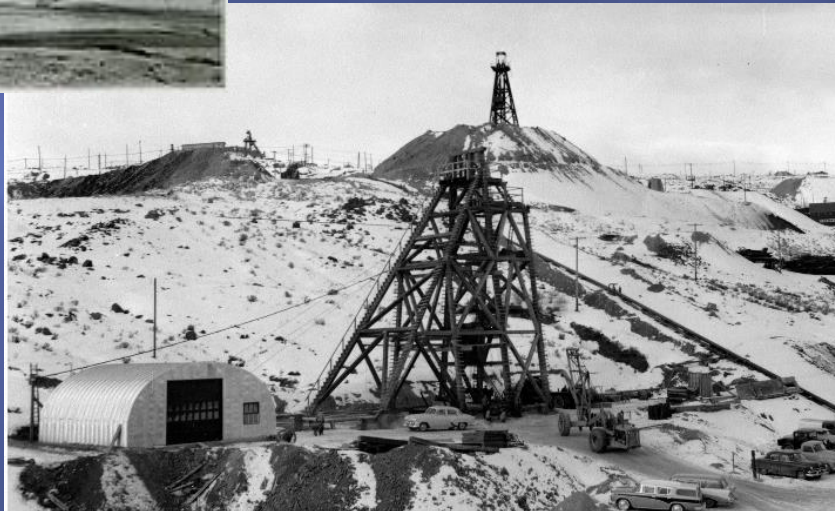
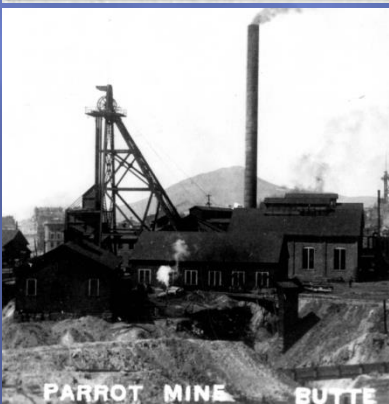




Mining, right...



# Lots and Lots and Lots of Mining.





# Did Butte Really Want a BIG Hole in Its Back Yard?

## Protest, Power,

and the

## Pit by Brian Leech

### FIGHTING OPEN-PIT MINING IN BUTTE, MONTANA

VINCENT CIABATTARI, a retired machinist for the Anaconda Company, sat in his disintegrating neighborhood talking with an out-of-town reporter. It was early 1974, and the reporter wanted to hear about Ciabattari's experience living in one of the old ethnic communities being devoured by the Berkeley Pit. Like Meaderville, McQueen, and Finn Town before it, Ciabattari's working-class community of East Butte was facing mine expansion, which brought blasting noise, waste dumps, and dust-kicking trucks right next to Ciabattari's small house. The reporter described the East Butte neighborhood as "a moribund suburban wasteland." Of the 260 families who had lived in the area just a few years before, Ciabattari was one of only 70 who hadn't yet sold homes to the Anaconda Company. Although the Company had given these working-class residents what many considered to be a "fair deal," Ciabattari still wondered why they had accepted Anaconda's offers. Why had they left their tight-knit group of friends and family, losing both their Catholic church and school? "The way this community was, you'd think the people would have got together and fought. People said they'd fight, but then they jumped," Ciabattari mused.<sup>1</sup>

Children playing in Walkerville among cracks caused by excavation of the Alice Pit in 1960



# Open Pit Dilemma: Counterbalance?

## CORPORATE VIEW

- Lots of low grade ore left (2/3)
- Lower cost of production
- More Production  
(1950: 7,960 vs 1960: 8,430)
- Safer than underground  
(2500 deaths UG vs 5 in Berkeley)

## UNION VIEW

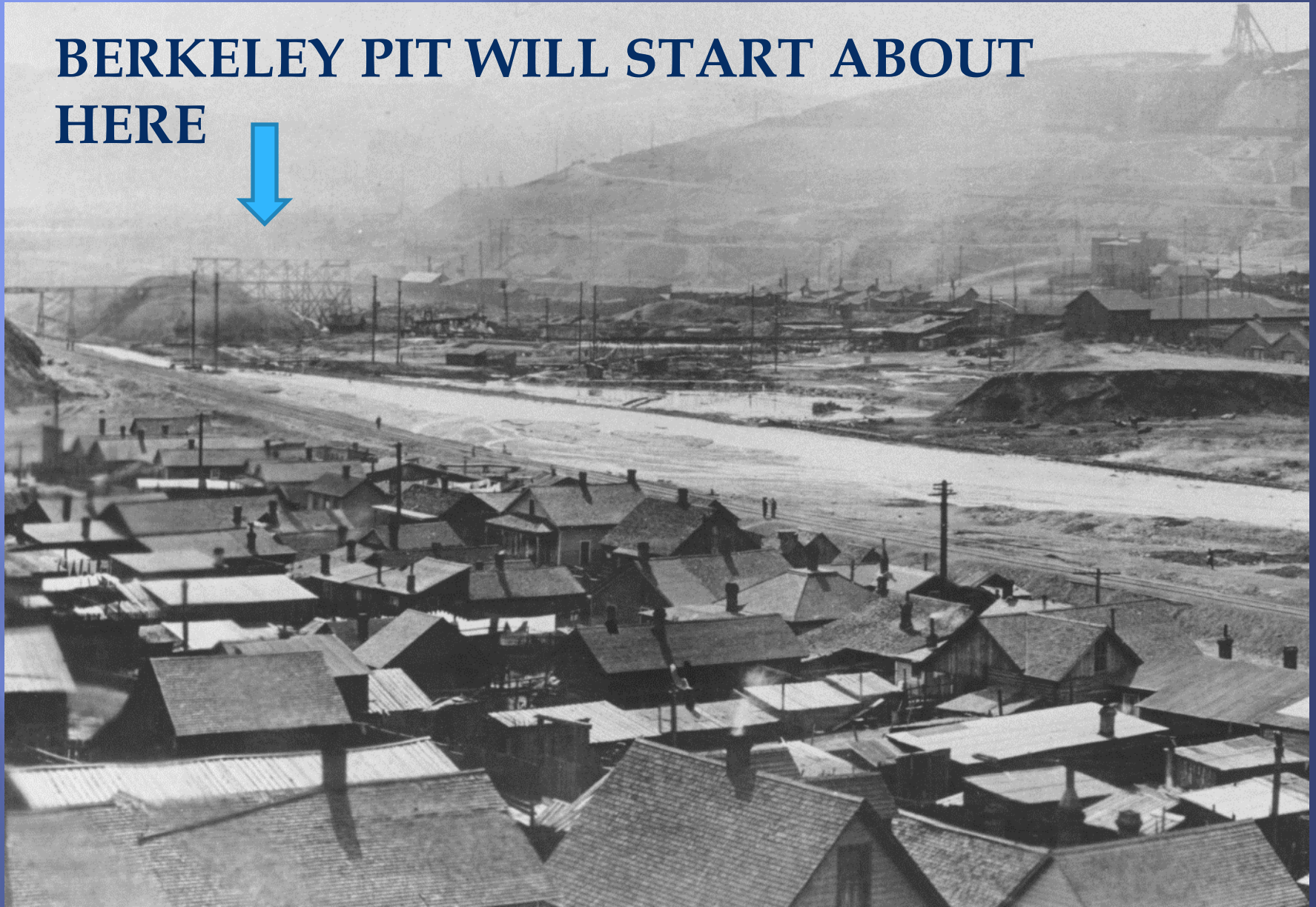
- it will reduce # of jobs  
(1950: 4,586 1960: 2,159 1980: 1,200 Now: 350)
- required less skill
- pay lower wages

## Community View

- ☐ It will eat our neighborhoods
- ☐ But what would the "Mining City" be without mining?
- ☐ What would a "company town" be without a company?



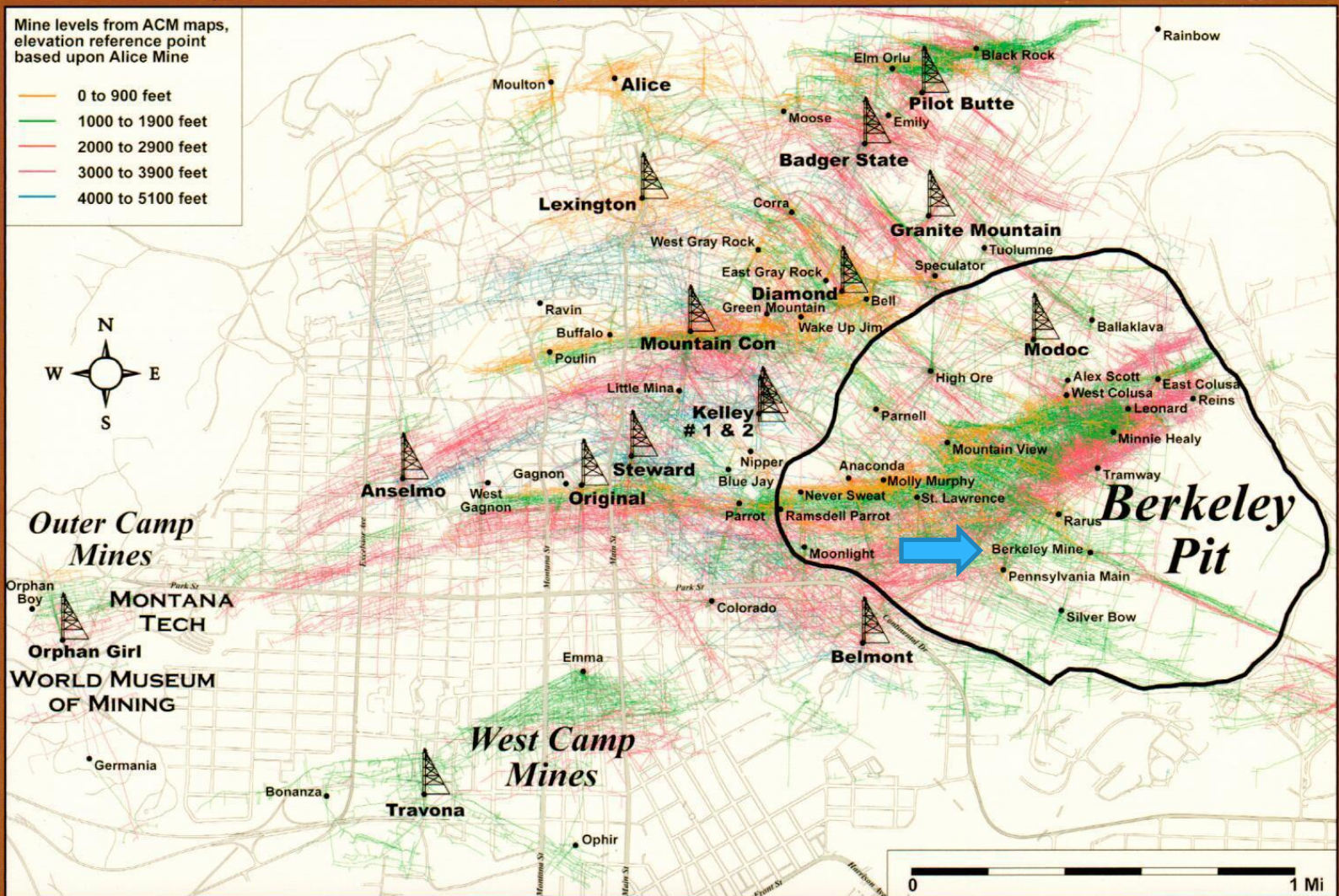
**BERKELEY PIT WILL START ABOUT  
HERE**





# Why at the Berkeley Mine?

# BUTTE, MONTANA, RICHEST HILL ON EARTH



MONTANA BUREAU OF MINES AND GEOLOGY



**Starting in about 1955**





bmf\graphics\photo\historic air of Bpit.bmp

# Early 1960's



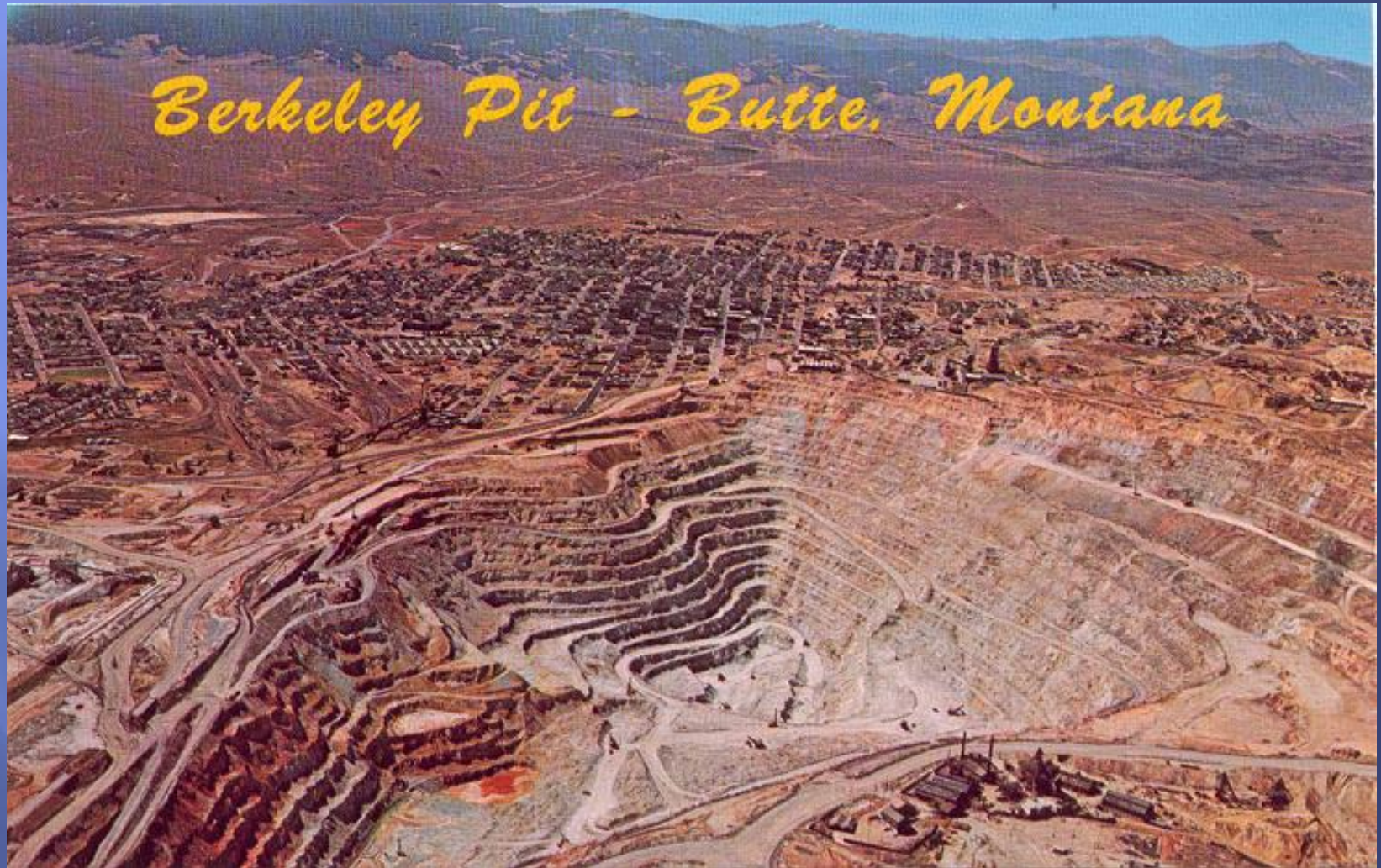


Late 1970's

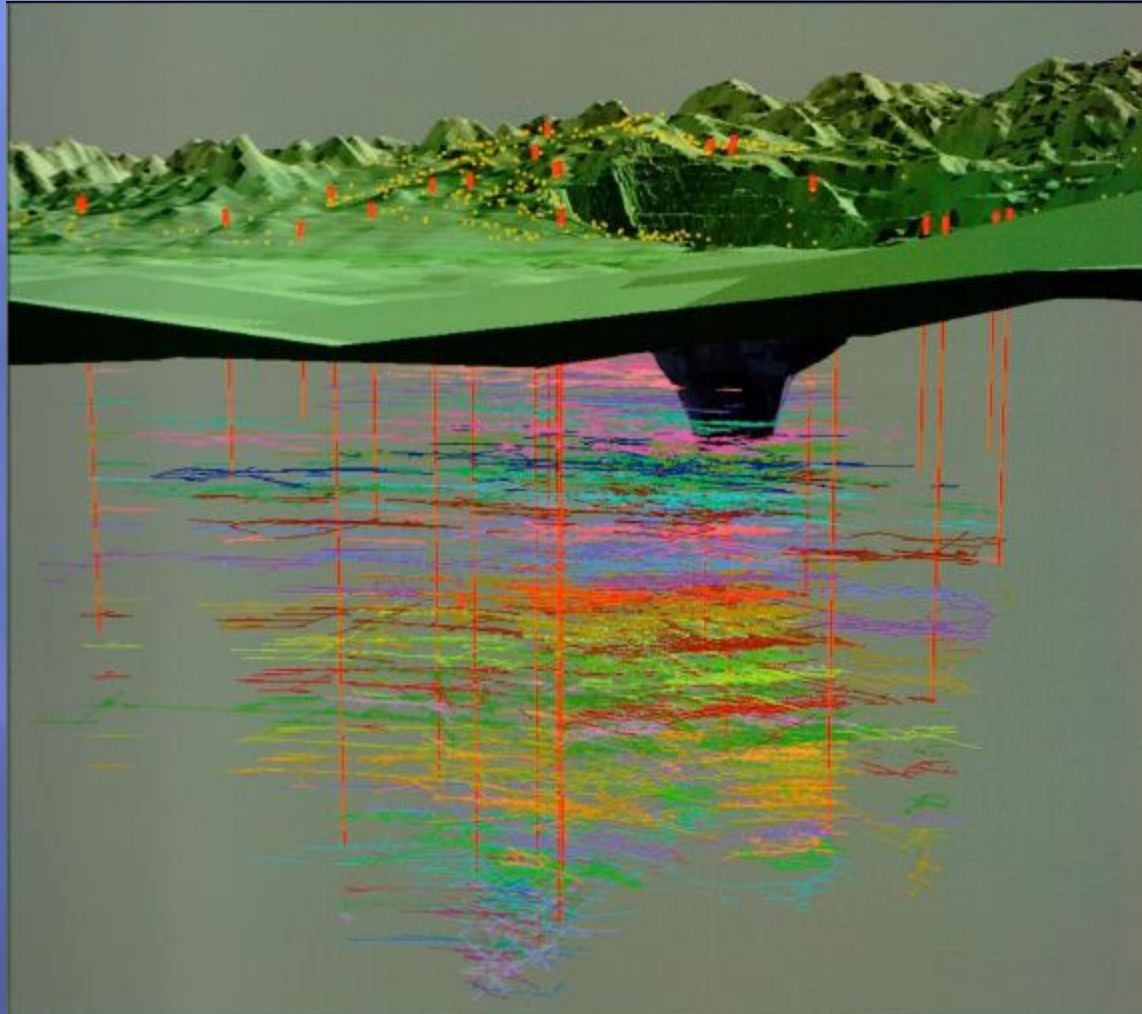




Butte Cold War Joke: Why was Butte a good place to be if the USSR ever attacked the USA?



# Berkeley Pit/Butte Hill Cross Section





# WHY DID THEY STOP MINING IN THE BERKELEY PIT?

- Production slowed as pit got deeper
- Higher Arsenic concentration
- Copper Prices

So, plan was to:

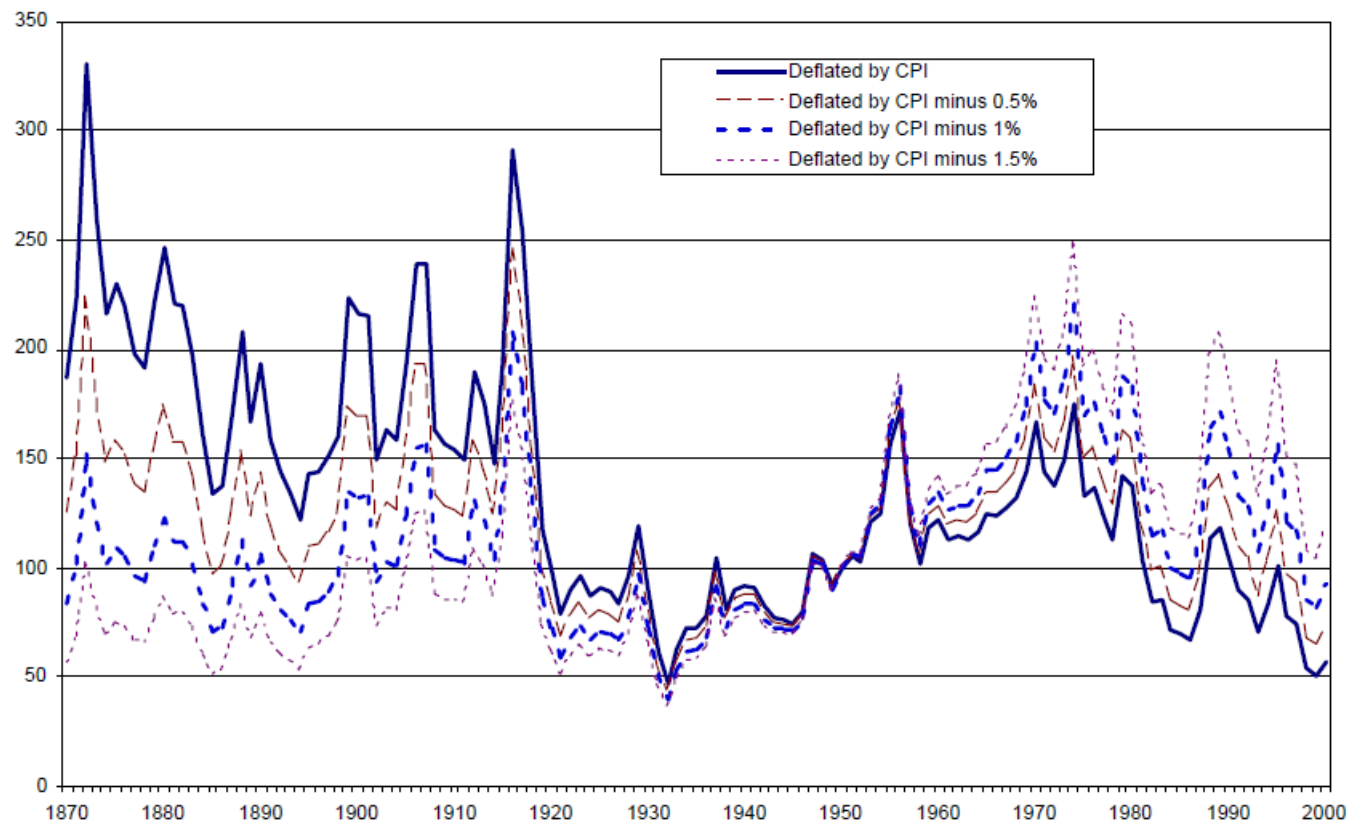
- Expand Berkeley Pit to the West
- Block cave under Berkeley
- And start mining in Continental Pit

# Why did they turn off the pumps?

- Economics: price of copper crashed
  - \$10,000,000 per year to run pumps
- Flooding: preserves underground workings
- Reduce Acid-Generating Reaction:
  - Mineral + Water + Atmosphere

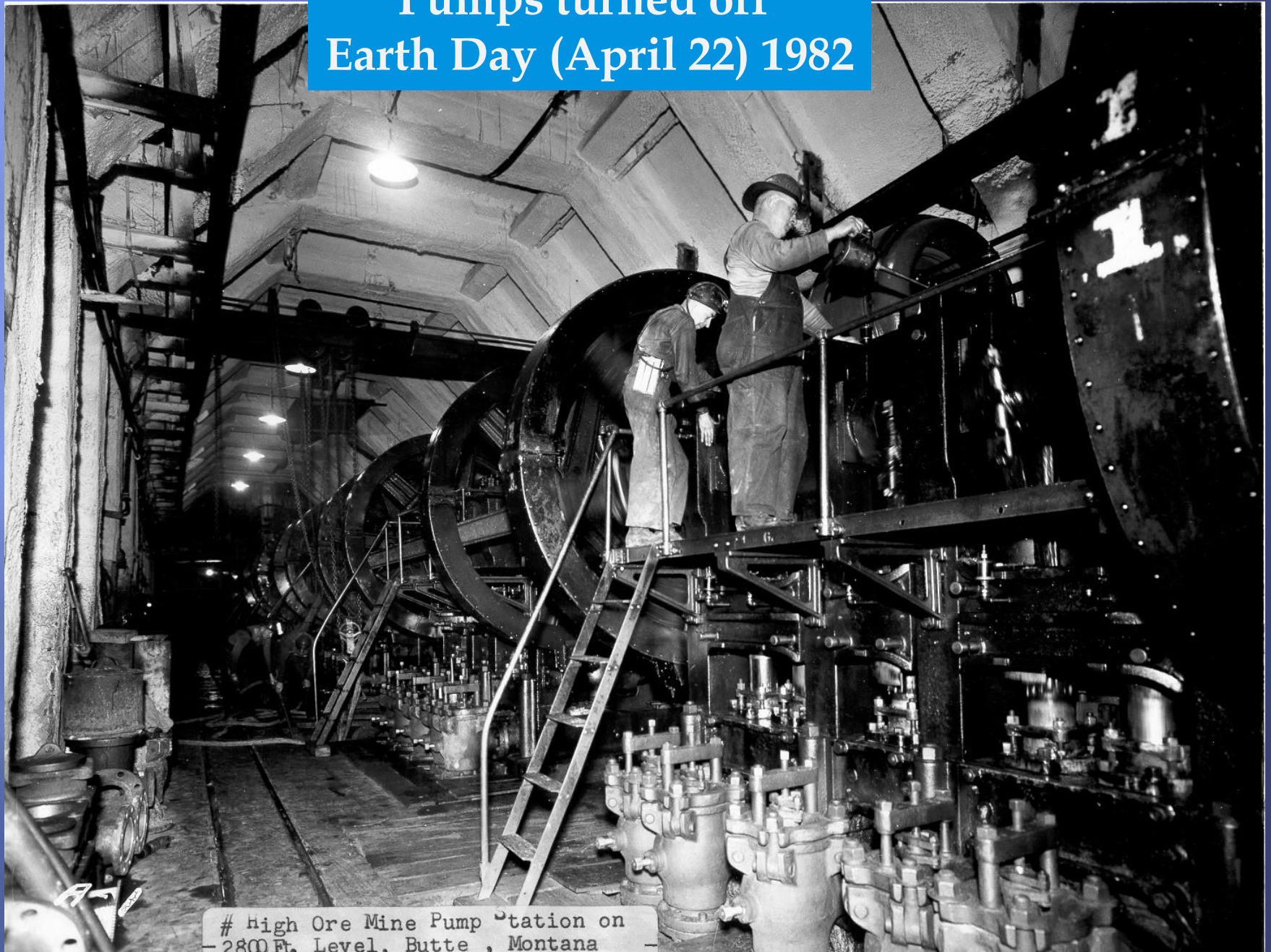
# Historic Price of Copper in USA

**Figure 2. The U.S. Producer Price of Copper Deflated by the CPI from 1870 to 2000 with 1950 = 100**

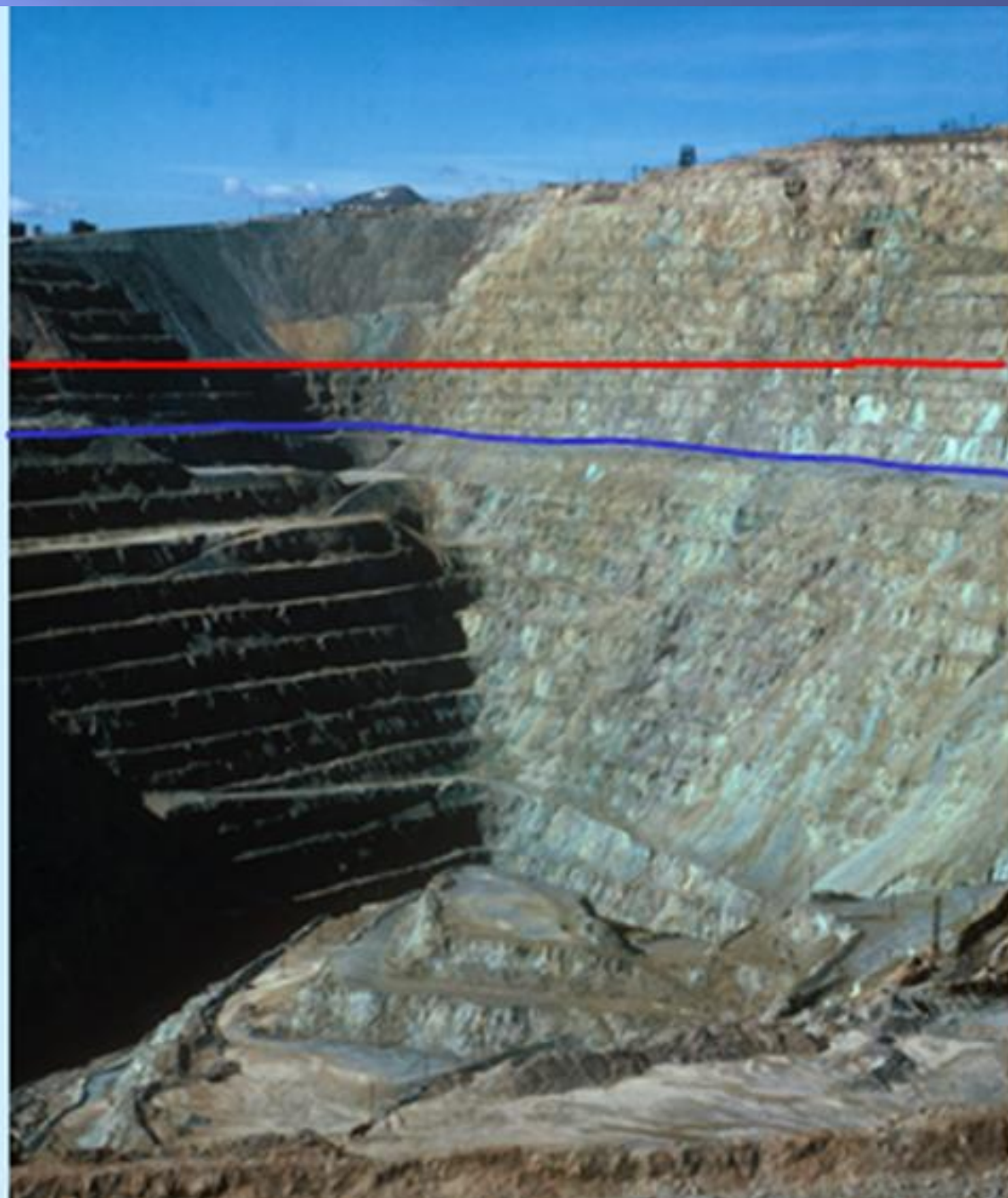




Pumps turned off  
Earth Day (April 22) 1982



# High Ore Mine Pump Station on  
- 2800 Ft. Level, Butte, Montana -



**Approx. 5410' level**

**Fall 2002 water level  
5225'**





Mid  
1980's





2010 — white dot on north shore is pump house







Fritz  
Daily  
photo

Lake Berkeley - July 2013

# THERE ARE NO “RE-DO’S” FOR THE BERKELEY PIT

... so now what?



# “Pump and Treat” in “perpetuity”



Horseshoe Bend Water Treatment Plant