100006199 - R8 SDMS

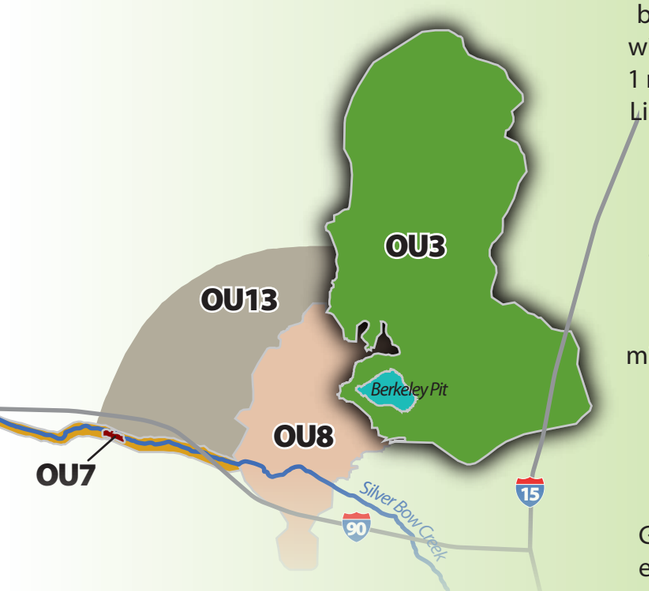
# A Quick Look at Superfund in Butte, Montana

# Butte Mine Flooding Operable Unit

Silver Bow Creek/Butte Area Superfund Site

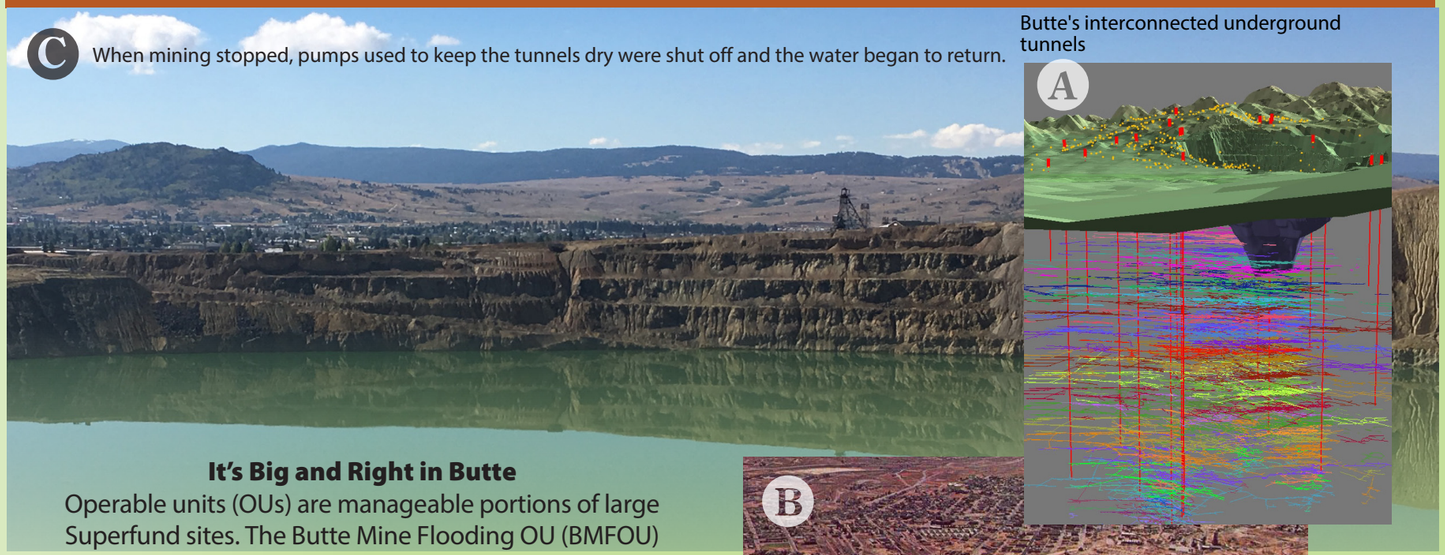
***EPA's mission is to protect human health and the environment.***

***EPA involves communities in the Superfund process that tracks work along a time line to make sure the site is cleaned up and can be used again.***




**For more site information:**
please contact Chris Wardell, EPA Community Involvement Coordinator, phone: 303.312.6062, email: wardell.christopher@epa.gov

## Know the Basics

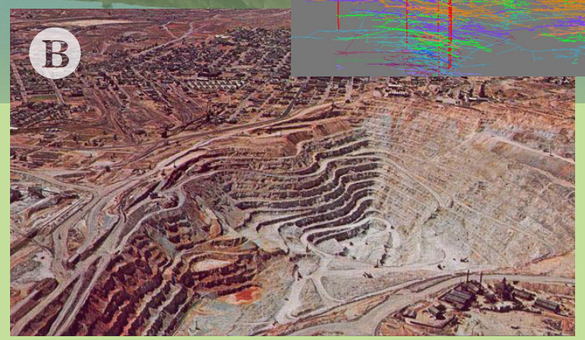



**It's Big and Right in Butte**
Operable units (OUs) are manageable portions of large Superfund sites. The Butte Mine Flooding OU (BMFOU) includes the Berkeley Pit, underground mine workings, and bedrock aquifer below the city (see map). It is 5,097 acres, with 420 covered by the pit. The pit surface is ~1.5 miles by 1 mile across. It is 1,780 feet deep—taller than the statue of Liberty, Empire State Building, and Our Lady of the Rockies combined.

**It's Mining-Related**
There are over 10,000 miles of underground mine tunnels in Butte (picture A), enough to cross the United States three times. Many tunnels are connected to the former open pit mine (1955 to 1982) (picture B). When mining stopped, the pumps were shut off and water began to return (picture C). That water was contaminated by contact with exposed minerals in the tunnels and pit.

**Contamination Is Mainly in Water**
Water in the pit is very contaminated and acidic. Groundwater contamination is less concentrated but still extensive, and the plume of groundwater contamination extends beyond the pit itself.

**It's a Team Effort**
Investigation and cleanup continues to be completed by the Atlantic Richfield Company and Montana Resources under EPA oversight.



Berkeley Pit in operation

**A LOT Has Been Done**
The record of decision for cleanup was signed in 1994 and remedial action began in 1996 with the diversion of water from Horseshoe Bend drainage. Montana Resources operates the adjacent Continental Pit. Montana Resources and Atlantic Richfield Company constructed the Horseshoe Bend Water Treatment Plant, which began operation in October 2003.

**Work Remains**
Design and cleanup continue. The primary goal is to ensure that the level of the incoming groundwater is kept below the protective water level. Work in 2019 to meet that goal is shown on the reverse.

**www.epa.gov/superfund/silver-bow-butte**

## The Life of a Site*

| SUPERFUND STEPS | | |
|---|---|---|
| Identify Problem | 1 Discovery/ Site Listing | Determine if it should be a Superfund site. |
| | 2 Remedial Investigation/ Risk Assessment | Delineate contamination. Determine risk. |
| Develop a Solution | 3 Feasibility Study | Evaluate how to best clean the site. |
| | 4 Proposed Plan (Public Comment) | Inform the public. Get their input. |
| | 5 Record of Decision | Make the final cleanup decision. |
| Cleanup | 6 Remedial Design | Determine cleanup details. |
| | 7 Remedial Action | Clean up (excavate, treat, cover, etc.). |
| Confirm | 8 Operations & Maintenance | Operate and maintain remedy. |
| Done | 9 Delisting | Cleanup complete. Remove from NPL. |

* Super Simplified

## Butte Mine Flooding Issues

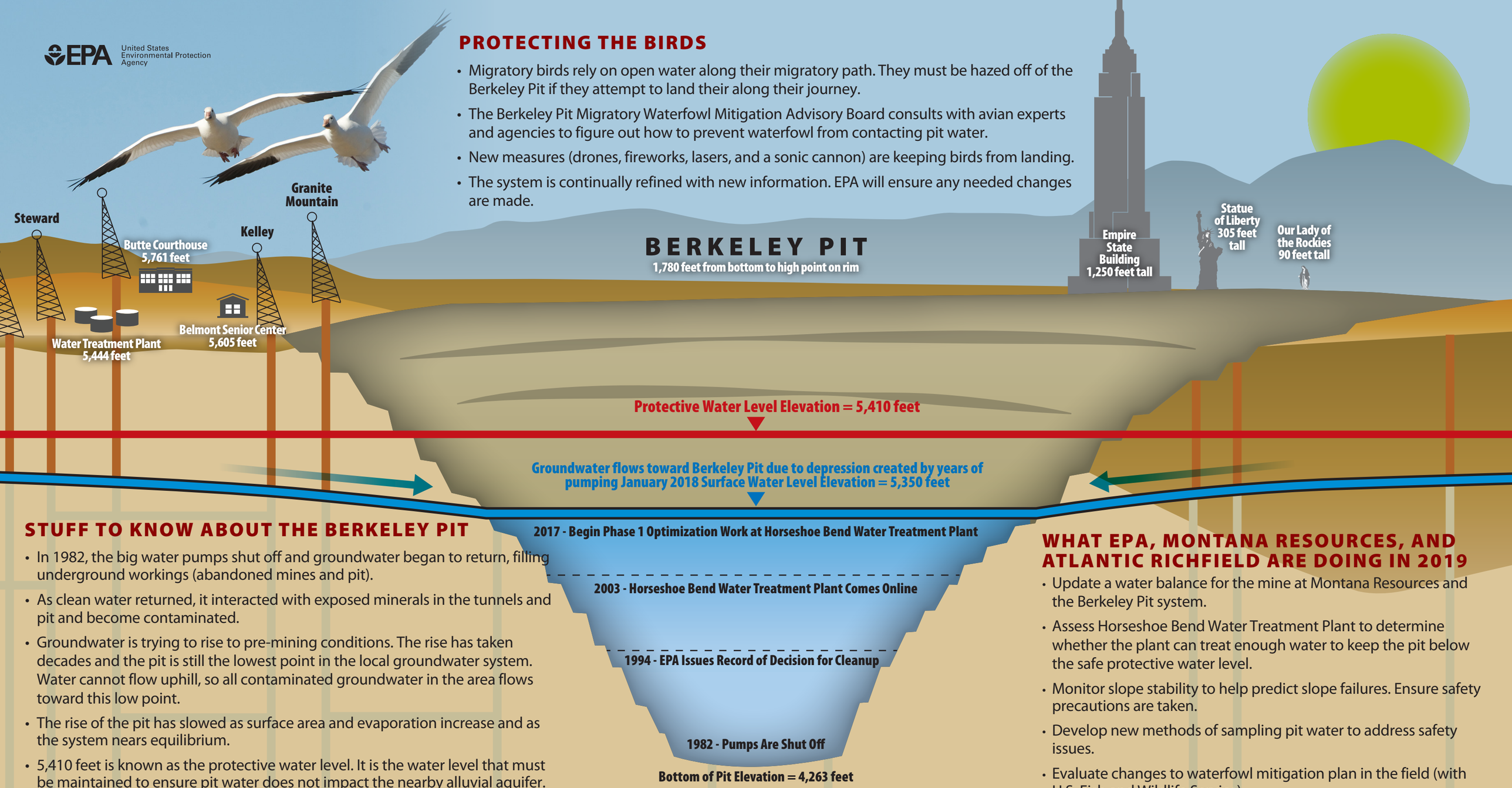
Arsenic **As** · Iron **Fe** · Cadmium **Cd** · Lead **Pb** · Aluminum **Al**

Humans · Ecological · Zinc **Zn** · Copper **Cu**

EPA United States Environmental Protection Agency

## PROTECTING THE BIRDS

- Migratory birds rely on open water along their migratory path. They must be hazed off of the Berkeley Pit if they attempt to land their along their journey.
- The Berkeley Pit Migratory Waterfowl Mitigation Advisory Board consults with avian experts and agencies to figure out how to prevent waterfowl from contacting pit water.
- New measures (drones, fireworks, lasers, and a sonic cannon) are keeping birds from landing.
- The system is continually refined with new information. EPA will ensure any needed changes are made.




## STUFF TO KNOW ABOUT THE BERKELEY PIT

- In 1982, the big water pumps shut off and groundwater began to return, filling underground workings (abandoned mines and pit).
- As clean water returned, it interacted with exposed minerals in the tunnels and pit and become contaminated.
- Groundwater is trying to rise to pre-mining conditions. The rise has taken decades and the pit is still the lowest point in the local groundwater system. Water cannot flow uphill, so all contaminated groundwater in the area flows toward this low point.
- The rise of the pit has slowed as surface area and evaporation increase and as the system nears equilibrium.
- 5,410 feet is known as the protective water level. It is the water level that must be maintained to ensure pit water does not impact the nearby alluvial aquifer.
- Careful water management, timely pumping, and robust treatment of contaminated water at the Horseshoe Bend Water Treatment Plant, will prevent pit water from reaching the protective water level and the pre-mining level, ensuring that the pit remains the lowest point in the system.
- **The Berkeley Pit will not overflow.** Current water level is 5,350 feet and the protective water level is 5,410 feet. By comparison, the wastewater treatment plant near I-90 is 5,444 feet - **that is 34 feet higher than the critical water level!**

Horseshoe Bend Water Treatment Plant

## WHAT EPA, MONTANA RESOURCES, AND ATLANTIC RICHFIELD ARE DOING IN 2019

- Update a water balance for the mine at Montana Resources and the Berkeley Pit system.
- Assess Horseshoe Bend Water Treatment Plant to determine whether the plant can treat enough water to keep the pit below the safe protective water level.
- Monitor slope stability to help predict slope failures. Ensure safety precautions are taken.
- Develop new methods of sampling pit water to address safety issues.
- Evaluate changes to waterfowl mitigation plan in the field (with U.S. Fish and Wildlife Service).
- Build a polishing plant and infrastructure to treat water from the Yankee Doodle tailings impoundment and discharge to Silver Bow Creek. Pump water from Berkeley Pit and treat for use in mining circuit.