EPA United States Environmental Protection Agency

A Closer Look at Smelter Slag

ANACONDA SMELTER SUPERFUND SITE, ANACONDA, MT

EPA Region 8, Montana Office | September 2021

The most recognizable features of the Anaconda Smelter Superfund Site are the towering stack on Smelter Hill and the black slag piles that line the south side of Montana Highway 1 between Anaconda and Opportunity. Anaconda residents drive by the black slag piles regularly and may even find themselves chipping golf balls out of sand traps made of slag at the Old Works Golf Course, yet most people don't know what slag is, where it came from, or if it is a concern. This fact sheet provides answers to those and other frequently asked questions.

What is slag?

Slag is a byproduct of smelting. It is what's left from copper ore after the copper is extracted in the refractory furnace. It is mainly copper sulfide, copper-iron sulfide, and copper-arsenic sulfide, with small amounts of other metals. Slag was produced over the 100 years that the Anaconda smelter operated.

Slag up close

What does slag look like?

Anaconda slag is black and glassy. From a distance, the Main Granulated Slag looks a lot like a pile of black dirt. Up close, the texture is granular, like coarse sand. The water-cooling process used during slag production at the Anaconda smelter prevented the Main Granulated Slag from clumping into a solid mass, as is found in East Helena or Butte.

Slag seen from a distance

Where is the slag located?

Slag resides at three places within a mile of each other: the Main Granulated Slag (south of Montana Highway 1 near the intersection with Highway 48), the Anaconda Landfill Slag (north of Warm Springs Creek), and the West Stack Slag area (in a gulch west of the stack). These locations make up Remedial Design Unit 12 and are privately owned. Slag piles should not be accessed by the public or trespass violations will be issued.

Primary locations of stored slag

The U.S. Environmental Protection Agency's mission is to protect human health and the environment.

Frequently Asked Questions About the Anaconda Slag

How much slag is on site?

The total land area covered by slag at the site is **195 acres—about the size of 147 football fields.** By far the most slag is at the Main Granulated Slag (168 acres). The Anaconda Landfill Slag (16 acres) and West Stack Slag (13 acres) are much smaller. The estimated volume of slag is over **16.1 million cubic yards which would fill over 160,000 52-foot-long coal cars** if the slag were shipped off site.

Is slag useful for anything?

Granulated slag is extremely hard and can be sorted into a variety of sizes, so it can be useful for industrial purposes and construction in much the same way that coarse sand is. Granulated slag from steel blast furnaces has been used as raw material for cement production, as an abrasive for sandblasting metal, and as a component of asphalt for paving projects. Slag has also been used as a component of aggregate roofing tiles. EPA also approved the use of slag in the Old Works Golf Course and bunker sand after it was determined to be safe.

The original (1998) cleanup remedy for the Anaconda site left the slag in place and uncovered to allow all opportunities to be made to **turn the waste product into a useful resource that could provide economic benefits to the community and reduce cleanup costs for dealing with the unused slag piles**. Atlantic Richfield, the owner of the Main Granulated and West Stack slag piles, continues to explore opportunities to reprocess the slag.

Can anyone use the slag for any purpose?

No! The slag at the Main Granulated Slag and West Stack Slag are on private property and use of those materials without permission constitutes trespass and theft. The slag is a mining byproduct residing on a Superfund site and EPA approval is required for any use of that byproduct. This ensures that EPA is aware of what is happening to the slag and that unauthorized use will not spread contamination or expose the public to unnecessary risks.

There are several approved uses for the slag (such as those discussed above), but there are many more that are not allowed. For example, the once-accepted use of using slag to sand roads in winter has been prohibited by the Montana legislature.

Is the slag hazardous?

The glassy nature of slag makes it relatively stable in the environment. It does not leach contaminants, nor does it break down. However, **the *dust* that is intermixed with the slag particles may contain metals that can be hazardous if excessively inhaled over an extended period**. This exposure does not happen with activities such as driving by the slag piles or playing golf at the Old Works Golf Course. **Exposure to the slag must be in higher doses and much more frequent to be of concern**. It is the kind of exposure that can happen in an industrial setting, especially if large volumes of slag are being handled and adequate ventilation or respiratory protection is not provided.

Frequently Asked Questions About the Anaconda Slag

Do You Have A Slag Souvenir?

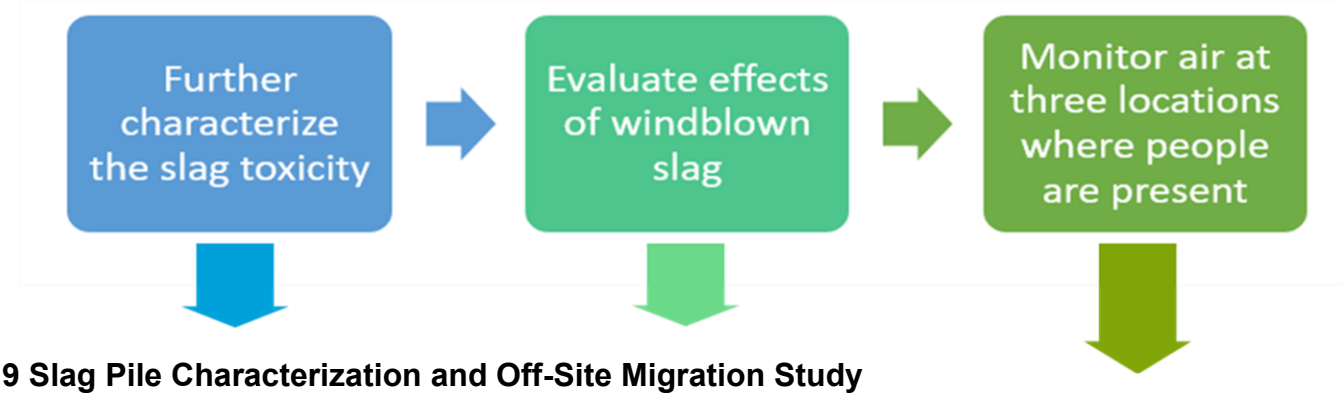
The Anaconda Chamber of Commerce previously sold souvenir bags of slag on its website under the name “Bag of Slag.” The plastic, zip-top sandwich bags contained granulated slag from an unknown source. Other small sales of slag as souvenirs have also been reported. This is not an approved use of slag and EPA stepped in to stop future sales.

If you have one of these unauthorized souvenirs, *please* do not let children handle it. Dispose of it in your local trash.

How is EPA assessing the question of slag safety?

EPA continues to collect samples from the slag pile for analysis of arsenic, lead, and bioavailability to ensure that conditions around the slag piles remain protective of human health and the environment.

EPA has directed Atlantic Richfield to do three things:



2019 Slag Pile Characterization and Off-Site Migration Study

Samples were collected from the surface of the Main Granulated Slag pile and surrounding soil locations. Samples were also collected from the Old Works Golf Course, Chamber of Commerce, and the pile of slag fines on top of the slag pile.

The results of the study showed that concentrations of metals vary widely across the slag pile and that fine particles of slag migrate from wind and can adversely impact adjacent properties. To address this potential, the 2020 Anaconda partial consent decree requires that the slag pile be partially covered to prevent further windblown erosion and transport. A final cover will be put in place once slag operations cease.

Air Monitoring

Air monitoring near the Main Granulated Slag began in 2020 and is ongoing. See the air sampler photo below.

Next Steps for the Anaconda Smelter Slag

Are there any future uses for the slag piles?

The slag may still provide opportunities for beneficial reuse for the material and EPA will consider proposals for new and innovative uses when proposed. Currently approved uses for slag are discussed on page 2.

What is the plan for addressing the slag long-term?

Atlantic Richfield continues to explore opportunities for reuse and is in the process of designing the cover required under the partial consent decree. That design will include regrading, placement of a vegetated soil cover, and construction of engineered storm water controls.

Engineering designs for the partial cover for the north and west slopes of the Main Granulated Slag and for the entire West Stack Slag (if development has not occurred) must be completed by 2024. Construction will start in 2025. The Anaconda Landfill slag will be addressed separately.

Dust suppression controls and monitoring will continue at the site to control the potential for adverse impacts to adjacent properties until the cover is placed on the slag piles.

The slag piles are private property and are off limits to the public for a variety of reasons, including public safety. Trespassers will be prosecuted.

Need More Information?

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