STATE OF PLAY: Butte-Silver Bow Superfund

More than 40 years after the designation, cleanup and remediation continue in a process that is simultaneously maddening and hopeful

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THE ENVIRONMENTAL QUAGMIRE that has engulfed Butte, Anaconda and the Clark Fork watershed all the way to Missoula is the result of more than 100 years of unrestrained mining. It began with the first gold strike along Silver Bow Creek in 1864, evolved into silver mining in the Butte area in the 1870s, and then went ballistic with a motherlode of copper ore that earned Butte its moniker, "The Richest Hill on Earth." While the Atlantic Richfield Company (ARCO) stopped mining in 1983, the digging continues, albeit at a much more restrained and careful pace, under the auspices of Montana Resources, one of the companies owned by Missoula industrialist Dennis Washington.

The footprint of that century of mineral-driven frenzy also encompasses Anaconda, where, starting in 1894, much of the copper ore was processed, and which subsequently earned its own Superfund status. Mother Nature got the upper Clark Fork River involved in early June of 1908. The combination of a late snowpack, warm temperatures and whopping rains turned Silver Bow Creek's normally modest flow into a rampage of epic proportions that poured into the Clark Fork, which in places spread more than a mile wide in

Montana Resources still operates mines along the Berkeley Pit in Butte.

Atlantic Richfield Company project manager Josh Bryson stands in the willows of Lexington Wetlands, which are currently being restored by the company in Butte.

a torrent reaching some 50,000 cubic feet per second by the time it reached Milltown Dam, just above Missoula. The flood deposited mine waste as much as a dozen feet deep along the way. As a result, Superfund cleanup is also actively underway from the Clark Fork headwaters at Warm Springs down as far as Garrison, and on downstream to the now-removed Milltown Dam at the confluence with the Blackfoot River. To date, nearly $3 billion has been spent on remediation work over this sprawling and multi-faceted Superfund footprint.

At the heart of the Superfund monolith, divided into seven areas known as "Operable Units," is the Butte Region/Silver Bow Creek complex, and it occupies a really big stage in its own right, extending from the epicenter of Berkeley Pit some 30 miles downstream along Silver Bow Creek, including Warm Springs Ponds at the headwaters of the Clark Fork drainage. Silver Bow Creek was named a Superfund site in 1983, and the surrounding Butte region was added in 1987. The site covers roughly 85 square miles, including the Berkeley Pit, 10,000 miles of underground tunnels, shafts and other "workings" underlying the city of Butte and the communities of Walkerville and Rocker. Although precise estimates are elusive, on the order of $400 million to $500 million has been spent to date on remediating that piece of the larger Superfund pie.

The legally binding, overarching mission of the Superfund program, administered by the U.S. Environmental Protection Agency (EPA), is to protect human health and the environment. Easy enough to say, but really hard to pull off. Achieving that outcome is a complicated, decades-long dance between science and politics, and the laws that spin out of that tango.

Wrapping arms around the scope of this enterprise is daunting. It can take a year just to get a grip on all the acronyms involved. It's important for context to understand a couple of site-wide, overarching caveats.

A term that crops up repeatedly throughout the Consent Decrees, Records of Decision and various work plans is "in perpetuity." Has a nice ring to it. Kind of rolls right off the tongue and lands on the page. In essence, it means forever, and the one thing we know for sure about forever is that there will be a lot of shoes to drop along the way.

Examples of *in perpetuity* items on the agenda include

Dave Williams is president of Butte's Citizens Technical Environmental Committee. "For so many years there were no controls in place," he says.

managing the Berkeley Pit, treating contaminated groundwater, regularly evaluating and treating previously remediated spots, and the operation and maintenance of features from stormwater treatment ponds to recreational trails. For these and a host of other issues, there is no point where we dust our hands and walk away, ever. How that plays out keeps evolving over time, impacted by new scientific breakthroughs, climate change, financial realities, political winds and unexpected circumstances.

Josh Bryson, one of the ARCO project managers, jokes that *in perpetuity* means that "I can retire at this job." In a more serious tone, he adds, "Ongoing maintenance and operation will continue after I'm done. It goes beyond me."

To Ian Magruder, *in perpetuity* is a concise and clear statement with little wiggle room. Magruder is a hydrogeologist with an engineering firm in Missoula and Technical Advisor for the Citizens Technical Environmental Committee (CTEC) in Butte. ARCO is "on the hook forever," says Magruder. "They never get to walk away. Hard to say what that will mean 200 years from now. Who knows if ARCO will even still be around?"

Molly Roby, one of the EPA Remedial Project Managers overseeing the work, sums up in perpetuity as "a truly daunting task."

J.P. Gallagher, Chief Executive Officer for Butte-Silver Bow City/County, underscores "the importance of wording in governing documents. Language like *in perpetuity* guarantees work going forward forever while allowing science to evolve and adapt to changing circumstances."

Another term that rears its head throughout Superfund discussions is "technical impracticability." It means that some things are just too damned hard to do. You can't realistically get rid of the Berkeley Pit, for example. There is also no practical way to remove every bit of tainted soil, reduce lead levels down to zero, permanently purify groundwater sources, or restore Silver Bow Creek to its original state. Simply can't be done.

What that leads to is an unavoidable and prolonged series of compromises between what is ideal and what is possible. What level of lead, arsenic, or mercury is acceptable in soil? What's the cutoff for lead in residential attics? What level of aquatic life returning to formerly polluted waterways is enough to declare victory? In each of these cases, and a passel more, every benchmark has to be agreed upon by all parties, scrutinized by lawyers, and hashed out in public before things move toward a conclusion.

It is complicated. Really, really complicated. Pick up any one thread of this Superfund challenge—the levels of lead in the blood of children, for example, or identifying an acceptable waste repository site, or whether Warm Springs Ponds should be left as they are or dredged and redesigned to approximate what was there before mining—and things immediately get thick and bewildering.

"Part of what makes this Superfund site complicated is that there are so many branches to it," says Magruder, the CTEC's advisor hydrogeologist. "Each one of the seven operable units involved is the equivalent of entire Superfund sites elsewhere in the country."

"For so many years there were no controls in place," says Dave Williams, current president of the CTEC board. "It is further complicated by the fact that the city of Butte sits smack dab in the center of it all." This isn't a remote and secluded toxic spot on the map that few people encounter. A thriving town is built right on top of it.

Just because a site gets listed on the Superfund list doesn't mean that shovel work immediately starts. It's a process, and in this case, a particularly convoluted one. Once Superfund is declared, the scope of the issues has to be delineated. That involves studies and tests that incorporate a gaggle of engineers and scientists, lawyers and politicians, agencies and businesses, and the public. It also involves hundreds of test wells, thousands of soil samples, ground and surface water mapping, heavy-metal testing in thousands of residential yards and attics, stormwater assessments, wildlife studies, and more.

Along the way the politics of identifying Principle Responsible Parties (PRPs) grinds along. Who's at fault, for what, and how much are they on the hook for? Also, who are the injured parties, the defendants, in this case? ARCO is the most visible PRP with the most skin in the game. Butte-Silver Bow County

"Superfund fatigue is a real thing. This process transcends careers, elections, lifetimes."

is listed as one of the settling defendants, which, according to Gallagher, the county's chief executive, "puts us in a pretty unique position of having leverage over the process."

All of this, ideally, leads to Consent Decree (CD) documents for each Operable Unit that all parties hash out, agree to, and sign up for. Other documents are wrangled through the tortured political process of council meetings, public comment, agency editing, lawyering, and negotiating, include the Records of Decision (ROD), and then the individual work plans. All of that takes decades and can resurface years later with amendments, as more information arises.

"Who knew how much difference there is between the words will, shall, and may in the legal world?" says Eric Hassler, who has been the head of the Department of Reclamation and Environmental Services (formally Superfund Department) for 24 years in Butte. Hassler oversees 22 full-time employees working on Superfund issues, and part-time workers as needed.

Each Operable Unit proceeds at its own pace, depending on the scope of the challenges, political priorities, and the complications that invariably arise. ARCO will present incremental design plans as they proceed toward a final document for each work project. At each level, public comments are taken, adjustments made, and then it goes back to the drawing board. Each stage takes time, often months or years. All of it before anything visible happens. It is excruciating. It is prolonged. It is fatiguing.

For Magruder, just keeping up with all of it is a full-time occupation. "My job is to digest as much Superfund information and current studies as possible," he says. "There are probably 100 people sending out studies and working on these plans. I have to translate and critique it all to facilitate feedback and understand what is good science and what needs improvement." Magruder then summarizes his findings to present to the CTEC board and formulate responses that help tweak the plans.

ARCO project manager Bryson points to the paperwork for the Grove Gulch project, one of the work sites within the Butte Priority Soils Operable Unit (BPSOU) currently underway in downtown Butte. "There are more than 3,000 pages on that site alone," he says. "And that's the easy one!"

"Superfund fatigue is a real thing," says Hassler. "This process transcends careers, elections, lifetimes. A daily part of my job is re-education. I am explaining and correcting information constantly."

Because so much of this preliminary work takes place on computer screens, in arcane engineering meetings, and between teams of researchers, to the uninformed it can look like nothing is happening. Vocal Superfund critics, self-appointed watchdogs, decry the slow pace of progress and the insufficient remediation. Their critique essentially boils down to: More needs to be done, money should not be an issue, and it needs to get done yesterday. Ironically, that pushback is one of the factors delaying the work. There is a well-earned level of mistrust of industry in Butte, based on the appalling toll of pollution and corruption that ran unchecked there for a century. That mistrust spills over onto the folks at work on the remediation, many of whom grew up in Butte and are raising families there.

"When people accuse us of trying to shortchange the community it's really hard for me to stomach," says Gallagher. "We all live here and are trying to do things right. I want to show off a community that exemplifies what remediation can look like."

To those who say that nothing has been done, all it takes is a

grim, black-and-white photo from the 1900s to prove otherwise. "I grew up here," says Gallagher. "When I was a kid the whole hillside Butte sits on was yellow."

While the pace can be agonizing, a lot has actually happened over the past 40 years.

Restoration work on 26 miles of Silver Bow Creek (about 80 percent of the stream course) began in 1999. Over the next 16 years more than 6 million cubic yards of waste was removed and taken to a repository near Opportunity. The streambed was reestablished and revegetated and riparian habitat was restored. The project cost some $130 million and was declared complete in 2015. Since that time trout have repopulated the river, beaver activity is notable, and other wildlife has returned. A 30-mile recreational trail called the Greenway is under construction paralleling Silver Bow Creek and connecting downtown Butte to Warm Springs Ponds.

In Butte, significant remediation was also underway to remove contaminated tailings, provide clean cover, and plant vegetation on the broad hillside overlooking town that was the site of much of the mining. A network of public trails wind through uptown Butte to the Granite Mountain Memorial site overlooking Berkeley Pit. A set of water treatment lagoons were installed alongside Silver Bow Creek to dose contaminated acidic groundwater with lime at a rate of up to 1,200 gallons per minute before returning it to the watershed. On the site of the former Parrot Smelter near the current Civic Center in the middle of Butte, contaminated soils and water were removed, replaced by 325,000 yards of clean fill, and the area was capped and landscaped between 2018 and 2023. Plans are currently in the works to build a wellness center on that formerly tainted ground.

At the Berkeley Pit itself, work began in 1996 to treat highly contaminated acidic water that is fed by groundwater and the thousands of miles of underground workings connected to it. Water is treated at the Horseshoe Bend Water Treatment Plant, which began operation in 2003. The water level is maintained in a zone below the local aquifer. The current pit water surface is roughly 5,350 feet, about 35 feet below the danger level. Berkeley Pit water is also a hazard to birds that land on it, and a bizarre collection of measures, including drones, other-worldly sounds, fireworks, lasers and a sonic cannon combine to haze birds away from the mile-wide body of water, which is 1,780 feet deep.

The Residential Metals Abatement Program (RMAP) began in Butte after the signing of the Record of Decision in 2006, since amended in 2020. Paid for by ARCO, RMAP is charged with testing the attics and yards of Butte residences for elevated levels of lead, arsenic, mercury and other metals. If elevated, soil will be excavated and replaced with clean fill, and attic insulation removed and replaced. Special attention is paid to public spaces like playgrounds, schools, daycare centers and parks. Testing of blood levels of lead, especially targeting children, is also available to the public for free. Some 1,500 area residences had been cleaned up through RMAP by 2023.

In 2024, new lead action levels were announced by the EPA, lowering residential standards from 1,200 parts per million (ppm) to 175 ppm. That new level will trigger additional treatments and retesting and will be applied to an enlarged footprint to include more than 7,000 additional homes surrounding Butte proper. The initial EPA proposal calls for a 25-year window for assessment and remediation of all qualifying properties, a timeframe that would stretch to 2050. There has been an immediate public pushback against that length of time, but the fact is that back in 2006 no one expected it to take this long to get 1,500 properties completed.

All of this, and more, is tangible, on-the-ground progress. Maddeningly slow, burdened by bureaucracy,

These photos from Google Earth show the Ramsay Flats area before and after remediation efforts.

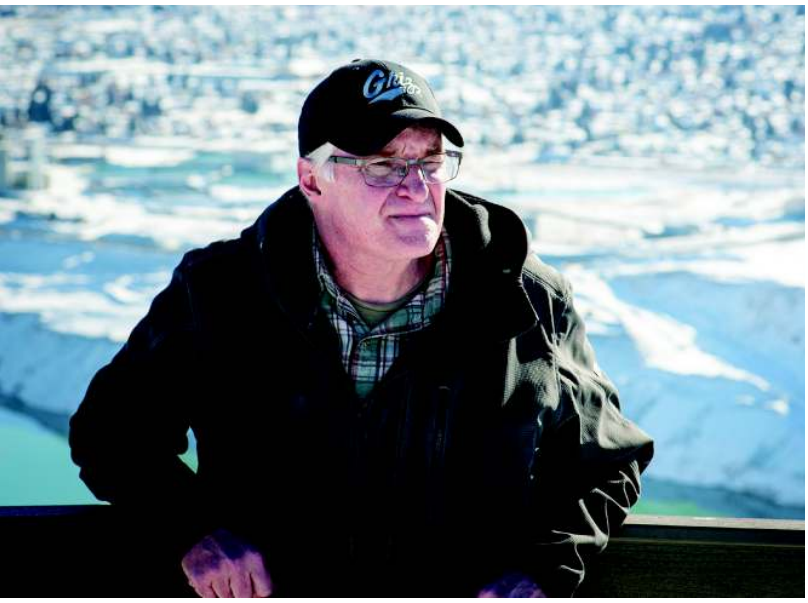
too complicated and challenging by far, but progress just the same. And all of it is a testament to the *in perpetuity* guideline. Even after these projects are declared complete, they still require routine testing, maintenance and repairs. At the same time—and largely behind the scenes—assessments, studies, and design plans have been proceeding at other Operable Units, grinding their way towards approval and implementation, with the usual predictable but unforeseeable delays that keep popping up.

The Superfund juggernaut fuels a "remediation economy" that forms an important component of the Butte economic base. Consider Hassler's department of at least 22 employees, the ARCO team of engineers, landscapers, technicians and contractors that Bryson works with, the agency people from EPA, the Montana Department of Environmental Quality (DEQ), the Natural Resource Damage (NRD) program, Butte/Silver Bow employees, construction firms, engineers, lawyers, and the rest. Many of them live in the area and pay local taxes. They frequent restaurants, rent apartments, buy homes, go to movies, serve on local boards. Every dollar spent on restoration circulates an estimated two or three times in the economy.

"The remediation economy connects to the university, to the mine, to local government, industry, private individuals," says county CEO Gallagher. "It's really significant."

In addition to paid employees, a cadre of volunteers help shepherd the process along. A number of folks have made Superfund a large part of their life's work, serving on boards, attending meetings, providing feedback, giving presentations, leading field trips, writing editorials, volunteering on cleanup. Some have had careers related to Superfund and continue to contribute after retirement. Others are professionals in the community with a stake in the future.

"My input has been in the form of citizen involvement," says Williams, the CTEC president. "I specialized in mine work and acid mine drainage treatment as a professional, and since retirement, I've been involved with the Butte Restoration Alliance on several projects, and am now the 'Chief Cat-Herder' at CTEC."



Eric Hassler, director of reclamation and environmental services for Butte-Silver Bow, says he often goes to an overlook of Butte and the Berkeley Pit when he needs a break. From there, he says he can see all of the reclamation work that has been done in his hometown. "I remind myself we do good things," he says.

Williams is typical of many of the Superfund volunteers who have been engaged for decades and who bring deep reservoirs of both scientific and institutional knowledge to the table. A number of members on the CTEC board, for example, have been involved throughout the decades-long process of hammering out agreements, work plans, and performing on-the-ground work.

Superfund fatigue notwithstanding, many stakeholders are upbeat about prospects for the near future.

"We've been rolling this snowball up the hill for a long time," says ARCO's Bryson, "but it feels like we're getting close to the top. This next decade is going to be exciting. I can feel the momentum now."

On everyone's shortlist is identifying a suitable place to store all the waste that needs to be removed, which needs to happen before major excavation takes place. Finding one is another example of the protracted nature of the process. In 2020 plans that had been developed for a waste repository south of town near Timber Butte were dropped due to public protest.

"That was a tragedy," says Hassler. "It was a really good design. What provoked the public outcry was misinformation and emotion."

Then, in 2024, plans for a repository in the Centerville/Dublin Gulch area in Butte were also abandoned after vociferous public outcry. Each of these proposals had been carefully designed and studied for suitability, the haul routes for waste transport mapped, and rounds of critique responded to, over a period of years.

"The public perception of risk is often misplaced," says Magruder. "I'm a good example. When I first came to Butte, I assumed I couldn't drink the water. I hauled water from a friend's well far from town. At the same time, I was riding my mountain bike through piles of contaminated mine waste." It turns out that, in fact, Butte's water treatment is among the best in the state.

"In the case of a waste repository," continues Magruder, "the material would be contained inside a fence, capped with clean fill, and left in a pretty inert state. Yet those same residents who are objecting might be living in a house with attic insulation contaminated with high levels of lead."

"Science is hard," adds Williams. "And people don't always like the answers science gives them."

The present repository site under consideration is the Berkeley Pit itself. The scheme has a compelling closed-loop appeal to it. Basically, waste would be transported in slurry form from remediation sites back into the depths of the pit, where much of it came from. There is also a dry waste site proposed around the edge of the Berkeley Pit near Shields Avenue. There is little public opposition to the current proposal, but studies are underway to assess such things as the potential for chemical reactions between organic material and the contaminated water that could produce dangerous levels of hydrogen sulfide gas. It could be as much as a year before a final decision is made.

"The short-term priority for us is to create efficiencies in preparation for upcoming work," says Emma Rott, an EPA Remedial Project Manager. Much like project managers on construction jobs, Rott, Roby and their cohorts focus on lining things up for the next season, getting designs through to completion, learning from past mistakes. Superfund is a bit like a symphony orchestra, and in that model, the EPA is the conductor setting the cadence and directing the flow. Each Operable Unit and every stakeholder might be seen as another section of the orchestra, playing their part and working for a modicum of harmony as the process lurches along.

"We had a lot of good momentum leading up to the final Butte Priority Soils Consent Decree in 2020," says Rott, "then Covid hit. We've been regaining momentum since then. We're much closer than people think."

Bryson ticks off projects within the Operable Units slated to come online in the near term. "Diggings East, Buffalo Gulch, Phase II of the Butte Reduction Works ..." He points to others nearing completion at Grove Gulch, Lexington Wetlands and more. "We just keep ticking off the boxes."

"I like it when shovels are in the ground," Bryson adds. "Then it's down to the doers, not the thinkers."

Of course, that optimism is tempered by decades of experience, disappointments and excruciating delays. Karen Sullivan, current CTEC board member and former Butte-Silver Bow Public Health Officer, speaks for many locals when she says, "I'd just like to see this stuff get done in my lifetime."