

The Montana Steward

ANSWERS TO SUPERFUND

A PUBLICATION OF THE CLARK FORK WATERSHED EDUCATION PROGRAM



THE MOUNTAIN CON MINE YARD (FOREMAN'S PARK) PHOTO COURTESY OF CFWEP.ORG

HOW DID THE CLARK FORK BECOME A SUPERFUND SITE? BY RAYELYNN CONNOLLE

The history of mining in the Clark Fork Watershed begins with the discovery of gold in Silver Bow Creek near Butte in 1864. Gold mining in Butte was rather short-lived; in fact, many historians reflect that the Butte camp was nearly a ghost town before the great copper boom of the 1880's. The demand for Butte's copper ores during the 1880's was fueled by our country's thirst for electricity during the industrial age. This demand created great wealth within the watershed, spreading beyond Butte to the communities of Anaconda, Deer Lodge, Bonner, and Missoula. The mining workforce numbered in the thousands and the economies that supported the mines thrived.

With all the underground mining came great amounts of waste. In the late 1880's and early 1900's environmental regulations were virtually nonexistent, allowing the wastes to be spread throughout the cities of Butte and Anaconda. Mining companies dumped waste rock all over the Summit Valley, creating acres of highly acidic materials throughout

the entire camp. Furthermore, tailings, the flour-like, acid-producing mine wastes that result from milling the ore, were discharged into Silver Bow Creek. For more than 100 years, Silver Bow Creek was an open industrial sewer, being used as a transport system for sending these tailings waste downstream.

Solid mine wastes were not the only contaminants being spread throughout the Clark Fork Watershed. There was also contamination from the toxic smoke that was produced by the burning of the crushed ore. The smelters of Butte, and later Anaconda, produced many tons of airborne arsenic and sulfur every day. This toxic smoke was such a big problem during the early days of mining, and the air quality of Butte and Anaconda was so lethal to residents, that the first city ordinance to address mine waste pollution was specifically linked to air pollution. In 1890 a city ordinance was enacted that banned open heap roasting (burning ore in the open) in order to minimize the harm caused by the smoke.

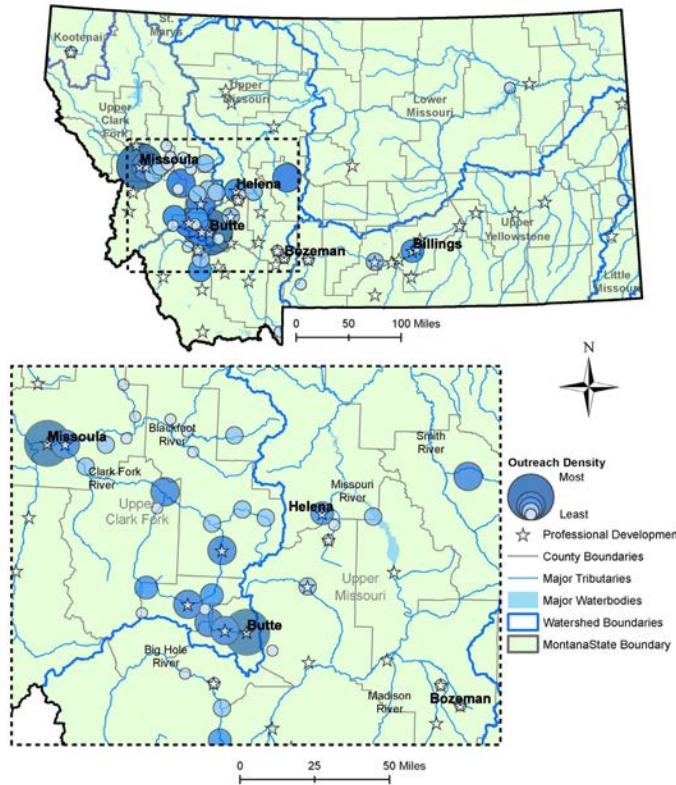
The rampant depositing of wastes throughout the Summit and the Deer Lodge valleys was further compounded by an unprecedented 100-year flood in 1908. This flood carried tailings wastes from Butte and Anaconda, and from the sediments of Silver Bow Creek and Warm Springs Creek, and spread them throughout the Clark Fork Watershed. The flood deposited millions of cubic yards of tailings along the river's bed, banks and flood plains before being stopped by William A. Clark's newly constructed Milltown Hydroelectric Dam.

For over 100 years, the areas of Silver Bow Creek and the Clark Fork River remained battle scarred. The banks of Silver Bow Creek were acidic and covered with yellow 'sand' that allowed nothing to grow. Depositional areas along the Clark Fork were named 'slickens' by the ranchers because of the tendency for the tailings to be slick when wet. The ranchers had to fence these slickens areas off from their cattle because of how harmful they were.

Mining continued in Butte with underground mining eventually giving way to open pit mining in the 1950's. In 1977, the Anaconda Company was bought by the big oil company, Atlantic Richfield Company (ARCO). In 1980, ARCO closed the Anaconda Smelter, marking the beginning of ARCO's exit from mining. The Berkeley Pit ended operations in 1982, and by 1983, ARCO had ceased operations in Butte completely. In 1983, ARCO shut off the pumps in the Kelley Mine, allowing the Berkeley Pit to fill.

Superfund law (CERCLA) was born in 1980 after years of environmental disasters around the United States caused by industrial and natural resource activities. In 1983, just three years after the law was passed, the Upper Clark Fork Superfund Site was designated. The State of Montana filed its complaint against ARCO in 1983 for the historic damages to our watershed. The series of settlements from this suit marked the beginning of the era of Superfund in the Clark Fork Watershed.

THE MONTANA STEWARD AND ANSWERS TO SUPERFUND ARE PRODUCED BY THE CLARK FORK WATERSHED EDUCATION PROGRAM (CFWEP.ORG)



MAP CREATED BY EVAN NORMAN,
DATA COMPILED & SYNTHESIZED
BY CHRIS DOYLE

THIS TRAVEL AND DENSITY OUTREACH MAP illustrates the distribution of programming provided by the Clark Fork Watershed Education Program (Cfwep.Org) throughout the state of Montana. Since our inception in 2005, Cfwep.Org has expanded to these many regions of the Clark Fork Watershed and the State of Montana with our extensive educational programs, professional development opportunities, camps, festivals, watershed days and community service events. Through our programming efforts, we have reached over 40,000 students to date. We recognized that in order to fulfill our mission to create a legacy of stewardship, teachers were key. Our teacher professional development programs have grown with grant support and now span statewide. Our current projects are sponsored by the Natural Resource Damage Program (NRDP), the Office of Public Instruction (OPI) and the National Institutes of Health, Science Education Partnership Award (NIH-SEPA), as well as local contracts and foundation gifts. We are able to continue to fulfill our mission statement of creating environmental stewards with our highly qualified staff team, generous partners and dedicated volunteers. For more information about what our organization is about, check out our website at www.cfwep.org. To volunteer or donate for one of our events, please contact Abby Peltomaa at apeltoomaa@mtech.edu or 406-496-4790.

THE DIRECTOR'S LETTER

RAYELYNN CONNOLE

This is the second edition of *Answers to Superfund*. Our first edition was published several years ago and much has changed since that time, not the least of which is that our then Director, Matt Vincent, is currently Butte Silver-Bow's Chief Executive. In this edition, we hope to provide an update on the progress of cleanup and management at the various sites, offer a deeper understanding of the Superfund Program, connect citizens to project leaders, and reflect on the legacy we wish to create here in western Montana.

When the Environmental Protection Agency listed the Clark Fork Watershed as a Superfund site in 1983, many residents of the basin found the label controversial and worrisome. Many wondered if our communities would ever recover from the moniker, "Largest Superfund Site in the Country." Some leaders and politicians hoped that Butte and Anaconda would distance themselves from the fact that our communities were listed on the National Priorities List for cleanup, claiming that economic development and growth would be stifled by this label.

Fast forward thirty plus years to the present day and one will find that there is still worry and controversy about Superfund. However, these worries have shifted. Today, our citizenry is concerned with ensuring the best possible cleanup, one that leaves a legacy of human and environmental health, and, yes, also economic growth and development that includes healthy mining practices. The economic impact of our watershed's green-collar jobs within the cleanup and environmental engineering sectors are equal to the impact of jobs in the mining sector. Thirty years ago, few dreamed that such an economic reality would come to pass.

In many ways, the communities of the Clark Fork Watershed are lucky to be listed and have a responsible party who paid damages to the citizens of Montana for cleanup. As you will see within this issue, not all Superfund sites have this advantage. Superfund law has changed greatly in the past thirty years. Most notably and ironically, Superfund itself is not funded. How did concerned, civically engaged, well-informed citizens allow this to happen?

Butte residents know that despite our worries, despite our disagreements, and despite our frustrations with the agencies, having an Environmental Protection Agency, a state Department of Environmental Quality, and concerned citizens is critical for gaining the funding to complete the work needed to help a watershed heal itself post environmental disaster. What would the communities of the Clark Fork Watershed have been like without a Superfund? Perhaps it is time to reflect and be grateful that we had excellent local and state leaders who foresaw the necessity of Superfund status, engaged in listing our area immediately, and remained at the helm to see this clean-up through to the end.

We can all agree that not everything has been done perfectly, but today we have the means and the knowledge to work toward the best possible outcomes. Cfwep.Org is uniquely not a political group nor an advocacy group. However, we believe that an educated and informed citizenry is critical to this process. Our work ends at the information and education stage. Your work begins once you know the facts. Please engage in the conversations about your communities. Work with your civic leaders to shape the legacy you wish to see in this watershed. We hope for a balanced legacy of healthy mining and a healthy environment. Stay informed. We all make better decisions when we have good information.

This publication's content is the result of collaborative efforts between many passionate and dedicated individuals. Each member of the Cfwep.Org staff team contributed time and effort to bring this guide to life. Our team is supported by incredible advisors who also guided and/or wrote pieces for this work. We'd like to extend special thanks to Julia Crain, Pat Cuneen, Jeni Flatow, Joe Griffin, Doug Martin, John Metesh, Justin Ringsak, Matt Vincent, Olivia Everett, Dave Hutchins, BT Livermore and our watershed's amazing students for their contributions to this publication. **This issue is dedicated to Frank Pankivar, artist, teacher and co-founder of The Montana Steward.**

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TEACHER FEATURE

DARCY SCHINDLER

BY ABBY PELTOMAA

DARCY SCHINDLER (LEFT) IDENTIFYING MACROINVERTEBRATES WITH HIS STUDENTS. PHOTO COURTESY OF CFWEP.ORG

DARCY SCHINDLER is the epitome of an excellent teacher who engages students in relevant, meaningful activities. He is always up for any new projects with his students. Darcy exposes his students to hands-on and timely issues to engage them with the community. He's helping to bridge an economic and environmental view for the long run. Darcy teaches 7th grade life science; 8th grade earth science; 9th grade physics; 10th grade biology, chemistry & physics, anatomy & physiology; and history of ecology/projects for the 11th and 12th grades. Darcy is also the head track coach and junior high girls' basketball coach. In his off time, he loves to spend time with family, chase his kids and support their endeavors, golf, camp, kayak on the river, motorcycle ride, snowmobile, and wood-working.

TELL US ABOUT WHEN YOU FIRST STARTED TEACHING.

I had taught about five to seven years in Hinsdale, MT. The high school had 35 students. I had two 8th graders - one boy and one girl. They had asked where I was going when they got done with 8th grade. I asked if there was something I didn't know and they answered that most science teachers don't stay in Hinsdale - they go to either Great Falls or Billings. It was really great because I got to be their sponsor and see them through graduation which surprised them. I started at Drummond in the fall of 2000. The superintendent at Drummond was a previous basketball and track coach of mine from Stanford and had asked if I would be interested teaching there. I've been teaching for 23 years now.

WHAT IS YOUR PERSPECTIVE ON EDUCATION IN GENERAL AND HOW DO YOU CARRY THAT INTO YOUR CLASSROOM?

My philosophy is to do as much hands-on as possible, but also give students enough background information. I engage my students in exploratory learning where kids experiment and don't even realize they are learning because they are having fun exploring and experimenting.

TELL US ABOUT YOUR HISTORY OF ECOLOGY PROJECTS CLASS.

It's a pretty open-ended class. We start down at the river and do a chemical analysis of the water; aquatic macroinvertebrates collection; stream profiling and

calculating the cubic feet per second and flow; vegetation analysis; and streambed analysis. We also talk about the 5C's (cold, clear, clean, complex, connected) and their relationship to our Montana trout. The students need to know what a healthy stream and ecology system look like. Through all of this, the kids take ownership of the river and take care of it. This year we also worked on building models for our Memorial Park. People buy bricks for the memorial wall. The students built three models of the wall and what it would look like so that folks could see what the memorial wall would look like. The students built the models out of a 3D printer, clay, and cardboard. We've also worked on an endangered species report where the kids had to identify three animals and plants species, and build a model of a wildlife refuge where they can rehab the species. They also had to put together a pamphlet about their refuge.

WHAT FIRST GOT YOU INTERESTED IN THE CFWEP.ORG RESTORATION EDUCATION PROGRAM?

Colleen (Elliott) and Matt (Vincent) called and said they wanted to offer a program to my class. They had piloted the program in Butte schools and now wanted to expand into the watershed. I've probably been working with Cfwep.Org for 10 years. When we first started, we went to the Clark Fork River in Garrison and then to the Clark Fork River in Drummond to compare the two sites. Initially, we worked with my 7th graders, but I also wanted

the program for my biology life science class for 10th graders. It's worked out well. My son Gregory went through the Cfwep.Org Restoration Education Program (REP) when he was a 7th grader in 2009 and then again as a 10th grader. Now he's studying petroleum engineering at Montana Tech. My daughter has also been through the REP program and will be a senior next year.

WHY HAVE YOU MAINTAINED AND SUSTAINED YOUR INTEREST IN THE CFWEP.ORG REP PROGRAM?

I like how it starts out. Its hands-on application with kids and how it affects them in their own backyard with mining and remediation. It's a great program all in all. The students come out with a better understanding of the environment after going through the program. It's a good eye-opener on the balance between economy and environment especially for the long term.

WHAT DO YOU LIKE BEST ABOUT THE REP PROGRAM?

I like the flow of the program, starting with the history and working through the concepts of what a watershed is. The students get interested in figuring out how the floods and deposition of tailings eventually impacted groundwater. I like learning about using aquatic macroinvertebrates as biological indicators. The different stations at the fieldtrip and visiting Foreman's Park in Butte ties into chemistry, history, and economics. It's looking at a real world problem and solutions to it.

WE KNOW YOU DO OTHER THINGS OUTSIDE OF THE CLASSROOM - CAN YOU TALK ABOUT SOME OF THOSE - SOME OF THE OTHER OUTREACH YOUR CLASSES DO WITH THE COMMUNITY?

I have a projects class. We did a tree identification for the town of Drummond for Tree City USA. We've also done blood drives in this class. A couple of years ago we did a design and cost analysis for the Kiwanis Park here in Drummond. The Kiwanis Park is next to

Highway 1 and borders the Clark Fork River. There's a blue heron rookery at one end that needs to be protected. The idea behind the analysis was for the Kiwanis Park to be an asset for the community. We looked at picnic areas, a parking lot, handicap accessible for fishing as well as doing a no-rise analysis because of the floodplain. We do Science Olympiad in the fall. We've competed since 2000 with junior high and high school students although now I've only been working with 6th - 8th graders. The Science Olympiad has 14 different events that the students compete in including: testing, bridge building, airplane building, car building and so on. There's a wide variety of events so it can encompass a broad range of students. I started doing the F1 Racing Competition this year with a 21st Century Grant. It's drag racing with CO2 emissions. It's been great! The kids have to put together a marketing portfolio with a business plan, design plan and get sponsorships. The students learn to use a CAD program to design the car. The competition was held at the Montana Tech HPER this last March and the students were judged on four to five areas including the race car and pit display. I worked with six freshman this year and we will continue on.

WHAT WOULD YOU LIKE THE CREEKS AND RIVERS IN OUR WATERSHED TO LOOK LIKE? WHAT CONCERNS DO YOU HAVE ABOUT OUR SUPERFUND SITES?

I think everything is on the right track. There's a lot more fishing, rafting, and floating so that's the right part of it. Drummond is fortunate because we don't seem to have as much need for remediation and restoration as other places. I like the direction it's all going. There seems to be balance between creating healthier environment while maintaining a strong economy. I think going forward in our superfund sites we need to look at what their future will be. I think about energy and how do we get back to hydroelectric power especially with what Montana is currently facing. It's the cleanest emission energy and how it can be done efficiently and not affecting fish or someone's farm.

LEXICON OF SUPERFUND ACRONYMS

Superfund acronyms are confusing and often the persons involved in Superfund sound as if they are speaking their own language. We are providing this lexicon as a brief orientation to the language of Superfund. We hope readers will find this list useful.

Each 'Operable Unit' of the Clark Fork Watershed is explained in detail on pages 8-9.

BAO

Butte Area One

Butte Area One was defined by the 2008 Montana v. ARCO Consent Decree. The settlement for damages to this area was \$28.1 million. The land area generally follows the historic riparian area of Silver Bow Creek within Butte. It is bounded to the east by Farrel Street, extends to the west to Whiskey Gulch, bounded to the north by Front Street, and to the south by I-90. BAO is not an operable unit as defined under the Superfund site status, although Butte Mine Flooding, Butte Priority Soils, and Streamside Tailings operable units all overlap within BAO. The restoration activities planned for BAO were intended to go beyond the remedial actions outlined for each operable unit, and include plans for restoration of injured resources and/or replacement of lost resources such as groundwater. The restoration plan for BAO allocated the following: \$10M restoration of Upper Silver Bow Creek; \$10M for water system improvements; \$6M for waste cap improvements/revegetation; \$1M for recreational improvements/access; and \$1M for small projects.

BMFOU

Butte Mine Flooding Operable Unit

BNRC

Butte Natural Resource Damage Council

This council is an appointed group of citizens who provide recommendations to the Governor of Montana regarding the expenditure of settlement dollars from the 2008 Consent Decree. The 2008 Consent Decree covered restoration of the land area known as Butte Area One. Six council members are appointed by Butte-Silver Bow's Chief Executive and three are appointed by the Governor. This citizen advisory council is entrusted to facilitate public discussion about the restoration plans, promote public understanding of the issues in BAO, and advise the Governor on restoration efforts. Council members are listed on p. 14.

Three Letter Acronym (TLA)

The usefulness of TLAs typically comes from how it is quicker to say the acronym instead of the phrase they represent, however saying "WWW" in English requires three times as many syllables than the phrase it is meant to abbreviate (World Wide Web).

BPSOU

Butte Priority Soils Operable Unit

CERCLA
Comprehensive Environmental Response, Compensation & Liability Act of 1980, which is also known as Superfund or Superfund Law

COC

Contaminants of Concern

Broadly defined, contaminants of concern are chemical elements or compounds that are known to cause a threat to human health, or animal and plant life. In the Clark Fork Watershed, the contaminants of concern are arsenic, cadmium, copper, lead, mercury and zinc. Arsenic, cadmium, and lead are particularly concerning for human health, while copper and zinc can affect aquatic and terrestrial life.

CD

Consent Decree

Consent Decree is the legal term for a settlement agreed to by court order. In a Consent Decree, the dispute between the parties is agreed to without admission of guilt. In the case of Superfund, the companies or owners are referred to as "potentially" responsible parties, rather than responsible parties as there is no admission of wrong-doing. In Superfund, the Consent Decree negotiations are the final step for settlement. The CD defines the methods, and extent of cleanup, as well as future monitoring plans. The CD is informed by the remedial investigation, feasibility studies, the Record of Decision, and any ROD modifications completed prior to the CD negotiations.

CGWA OR CGA

Controlled Ground Water Area

Controlled groundwater areas are identified in order to limit groundwater use for protection of human health, or to protect water right holders from overuse of groundwater resources. The Montana Department of Natural Resources and Conservation used its authority to designate a CGA in Butte to limit residents' access to contaminated aquifers. The Butte CGA encompasses three Superfund groundwater areas: Butte Mine Flooding, Butte Priority Soils and Montana Pole and Treatment Plant. The program is administered by the Butte-Silver Bow Water Quality District.

CWL

Critical Water Level

This term applies only to the Butte Mine Flooding Operable Unit. Set by the EPA and Montana DEQ, the Critical Water Level, elevation 5,410, marks the point where pumping and treating of Berkeley Pit water will start. The level was set well below the elevation where contaminated groundwater could escape the cone-of-depression surrounding the Berkeley Pit and contaminate Silver Bow Creek. (See graphic on p.7) It might be better referred to as the Safe Water Level.

DEQ or MTDEQ

Montana State Department of Environmental Quality

EPA

United States Environmental Protection Agency

ERA

Expedited Response Action

Expedited Response Actions are meant to address initial cleanup measures without waiting to complete the Remedial Investigation and Feasibility Study.

ESD

Explanation of Significant Differences

This legal term applies to the process that the EPA and PRP's utilize if there are significant changes to the Record of Decision. The ESD gives rationale for the changes that were made. The ESD is sent to the Federal Department of Justice for review. The information and data included in the ESD are reviewed by a federal judge. The public is allowed to send written comment letters to the judge regarding the changes proposed in the ESD, however, the ESD is not subject to the usual public comment period.

FS

Feasibility Study

Once the remedial investigation is complete, and the nature and extent of contamination are understood, the EPA evaluates various remedy options for technical, environmental, and cost concerns. The feasibility study guides the conceptual design and construction process. Typically, both the EPA and the responsible party will conduct feasibility studies. These studies are completed prior to the Record of Decision negotiations.

LAO

Lower Area One

Lower Area One designates that portion of Silver Bow Creek and its floodplain from Montana Street to the western boundary of the BPSOU. It includes the Butte Treatment Lagoons, the rebuilt stream and floodplain, Butte Reduction Works and the Slag Wall Canyon.

MS4

Metropolitan Separate Storm Sewer System

Although not technically a term directly related to Superfund, the term MS4 refers to the permit that municipalities are required to maintain from the State Department of Environmental Quality (DEQ). The MS4 permit guides how cities discharge stormwater to receiving water bodies. In Butte, stormwater is separate from sewage and is not treated prior to release to the creek. Butte's stormwater receives water from the remediated hillsides within the Butte Priority Soils Operable Unit. As such, stormwater from these areas can possibly be contaminated if the remediated caps are not holding appropriately.

NPL

National Priorities List

The National Priorities List is often interchanged with the term "Superfund Sites." The list refers to identified sites that have known releases of hazardous substances/pollutants/contaminants throughout the United States. As of May 13, 2016, there were 1,328 active sites on the NPL, 55 proposed new sites and 391 deleted sites.

NRD or NRDP

Natural Resource Damage Program

This program was established in 1990 to prepare for the state's lawsuit against Atlantic Richfield Company (ARCO). The NRDP is operated by the Montana Department of Justice and includes a team of litigation specialists, scientists, and engineers. NRDP currently manages the settlement dollars and restoration activities through its two local councils, the Upper Clark Fork River Basin Advisory Council and the Butte Natural Resource Damage Council.

OU

Operable Unit

Large acreage superfund sites, such as our site, are often broken into smaller management sections, or operable units. The operable units typically are divided by geographic constraints and/or nature of the remedial action needed.



COMIC BY DAVID HOPKINS



THE BPSOU 2006 RECORD OF DECISION. PHOTO BY OLIVIA EVERETT

ROD
Record of Decision

This is the legal term for the public document created by the involved agencies and the PRPs. The public document explains the clean-up plan and outlines the remedies to be utilized. The ROD is a legally binding document that is negotiated between the agencies and the PRPs involved. The ROD is subject to public comment, meaning that citizens are allowed to comment on the proposals outlined in the ROD prior to finalization. The ROD can be changed based on public feedback.

RODMOD
Record of Decision Modification or ROD Amendment

The Record of Decision can be modified if there are fundamental changes that the parties would like to implement. For example, new data and/or new technology may become available to the parties after a remedial action has been agreed to. If the new data and/or technology fundamentally changes the way that the remedy is handled, the parties can request a modification. The public is allowed a comment period for the ROD modifications. The EPA is required to accept comment on the proposed changes and respond to public comment prior to modification approval.

PRP
Potentially Responsible Party

This term is defined in CERCLA or Superfund Law as the company and/or individual owners who are potentially responsible for contamination at a Superfund site.

RI
Remedial Investigation

These investigations are intended to determine the nature and extent of contamination. The RI includes sampling soils, groundwater and streams. Often, both the responsible party and the EPA will conduct remedial investigations. The Record of Decision is based on the RI results and the follow-up feasibility study.

RIFS
Remedial Investigation/
Feasibility Study

In some literature and discussions, the remedial investigation and feasibility studies are lumped together and referred to as one study. Often, the remedial investigation and feasibility studies are conducted concurrently.

RA
Risk Assessment or
Risk/Health Assessment

The EPA assesses each site for risk from contaminants. Human health is the first priority for protection. For example, in Butte, soils in the uptown area were considered a priority for clean-up due to risks from lead contamination, hence the moniker, Butte Priority Soils Operable Unit. An additional example of human health risk as a priority is the case of the Milltown Dam. Arsenic contamination of personal drinking water wells in Milltown from the sediments behind the dam was considered priority for clean-up. The removal of the dam prior to sediments being removed upstream was considered imperative due to the human health risks from arsenic contamination. In addition to human health concerns, most sites also require an ecological risk assessment to understand the impacts on the animal and plant life in the area.

SSTOU
Streamside Tailings Operable
Unit (Silver Bow Creek)

TCRA
Time Critical Removal Action

At sites where human health is in imminent risk, the EPA and the DEQ may order time critical removal actions, meaning that hazardous substances must be removed in order to be protective of human health. Often, TCRA's are ordered ahead of the remedial investigation, feasibility study, and record of decision. Time critical removal actions are not typically intended to be the final remedy for a site.

TI
Technical
Impracticability

This term refers to waiving standards when it is impracticable from an engineering perspective to meet a standard. A TI can be invoked where the cost of cleanup is inordinately costly. The remedy must still protect human health and the environment. The vast majority of TIs address groundwater contamination. In Butte, a TI evaluation concluded that it would cost between \$11 and \$13 billion to clean up groundwater, with little certainty of the effectiveness of the cleanup. On that basis, the BMFOU was granted a TI waiver. Human health will be protected by not allowing residents to use the mine water. The environment will be protected by pumping and treating groundwater as it approaches the critical water level. Treated water will meet water quality discharge standards.

Students at the May 2016 Clean Up Blacktail Stream Day (CUBS) learning the language used to identify macroinvertebrates which includes arthropods (insects, mites, scuds and crayfish), molluscs (snails, limpets, mussels and clams), annelids (segmented worms), nematodes (roundworms), and platyhelminthes (flatworms). >>

TMDL
Total Maximum
Daily Load

This term refers to the regulated standard for any given pollutant within a state water body. The TMDL standards were defined in the Clean Water Act of 1972. The TMDL is intended to be protective of water quality and meet both aquatic life and human health standards.

UCFRB
Upper Clark Fork River Basin
Advisory Council

This council is appointed by the Governor of Montana to facilitate public dialogue, promote public understanding, and advise the Governor on remediation and restoration efforts. This volunteer citizen council is comprised of members from each of the affected communities within the Clark Fork Watershed including Missoula, Philipsburg, Butte, Anaconda, Ovando and a representative of the Confederated Salish and Kootenai Tribes. Government representatives from the DEQ, FWP, Natural Resources and Conservation, and the US Department of the Interior are advisory/non-voting members of the council. Council members are listed on p. 14.



IN THE SUPERFUND VERNACULAR, THERE ARE NO TWO TERMS THAT CREATE MORE CONFUSION AND CONTROVERSY THAN **REMEDICATION AND RESTORATION.**

In our common language, the two terms are often confused with a third term, reclamation and all three are given synonymous meanings. However, there are distinct differences. We will leave behind the term reclamation as that is a term associated with active mine sites and is regulated under state mining permits. Reclamation also refers to a variety of environmental activities such as reclamation of crop lands in order to make them useable again for growing food. Reclamation does not imply that the land will be returned to its original state, rather, the land will be returned to a useful state, as in our example of using the land for crops.

For our purposes, let us reflect upon remediation and restoration related to Superfund. One of the defining virtues of a Superfund site is the fact that the site has been abandoned and is not under regulatory permitting. What is the difference between restoration and remediation?

In order to fully understand the differences, a quick history lesson is important. Recall that in 1983 the State of Montana filed a claim against the Atlantic Richfield Company (ARCO) for injuries to the State's natural resources in the Upper Clark Fork River Basin. These damages were caused by the release of hazardous substances (smelter smoke deposits, tailings and waste rock)

related to the mining and smelting activities of ARCO and its predecessors. Those injuries were widespread and included injuries to surface and ground water, aquatic life, and terrestrial life. The State also sought compensation for the public's lost use and enjoyment of those injured resources. The State of Montana and ARCO agreed to a series of settlements beginning in 1999. The monies garnered from the settlements are considered restoration dollars and are "public funds" that belong to Montanans, not ARCO. Restoration funds in this case are distinctly not "tax dollars" and did not come from the Superfund monies set aside in the 1980's.

Montana's restoration funds were damages paid by ARCO under a legal settlement to compensate Montanans for the injuries to our resources—just like a victim in a car crash can get compensated for their personal injuries caused by the party responsible for causing the crash. Compare this fact to how remedy dollars are obtained. Sometimes, remedy dollars can be gained from taxpayers via the Superfund and other times, when there is a potentially responsible party (PRP) who is willing to work with the EPA, the PRP may pay for remedy. However, the citizens of Montana expected more than just protection of their health, hence, the claim for restoration dollars.

RESTORATION



RESTORATION IN SILVER BOW CREEK'S DURANT CANYON WHERE IN SOME PLACES UP TO 21' OF MINE WASTE WAS REMOVED FROM THE STREAM BED AND BANKS. IN THIS AREA, SILVER BOW CREEK (FISH AND ALL) WAS DIVERTED INTO A 42" PVC PIPE FOR MONTHS AT A TIME.

The ultimate goal of restoration is to return something to its original or natural condition. Often that lofty restoration goal is difficult to achieve, therefore, the Superfund statute allows states to replace the injured resource, acquire the equivalent of the injured resource, or to replace the services that the injured resource provided. The Governor of Montana, as the trustee of our natural resources, wanted the public to have direct involvement in the restoration process. Brian Schweitzer, the governor of Montana at the time the settlements were reached, created two citizen councils, the Upper Clark Fork River Basin Advisory Council (UCFRB) and the Butte Natural Resource Damage Restoration Council (BNRC), to advise him on how best to spend the settlement funds. Both councils developed a restoration plan stipulating how restoration funds should be spent. The Governor also created the Trustee Restoration Council (TRC). This council consists of the state's natural resource department directors who confirm the citizen councils' recommendations. The Governor heavily considers the advice of these councils before making the final decisions on how to spend restoration funds.

One of the intentions of restoration is to create a self-sustaining system that does not require long-term monitoring, maintenance, and management. In the case of Silver Bow Creek and the Clark Fork River, restoration includes removal of most of the wastes that were deposited along the riparian areas; floodplain connectivity; and utilization of native plants for revegetation efforts. These efforts allow normal ecological processes to unfold in each area.

In a practical sense, remedy and restoration can work hand in hand. When the first remedial actions were being taken in Butte, many old waste rock sites were quickly graded and covered with plant species that were not native to Montana. These non-natives were used because they were quick to establish and provided stability to the dump sites. Currently, the NRDP and the EPA are working closely together to re-establish native vegetation on the Butte hill, which will meet both the standards for remedy, by keeping the soils in place and preventing human contact with metals of concern, and also meet some of the restoration standards by including more native plants which offer both structural (size) and species diversity. The Butte hill will always require monitoring as per the remedy standards of Superfund. It is the intention of the parties working together that these now open-spaces can be the best habitats possible, given the circumstances. The soils have to remain in place, so there is need for stormwater management and good soil coverage from plants. However, by combining both remedy and restoration, the re-introduction of native plants should improve the local habitats and ecology.

REMEDICATION



EXAMPLE OF REMEDIATION - "WASTE IN PLACE" - AT THE BUFFALO DUMP. REMEDIATED SITES ARE COVERED WITH 12"-18" OF SOIL CAP AND REVEGETATED.

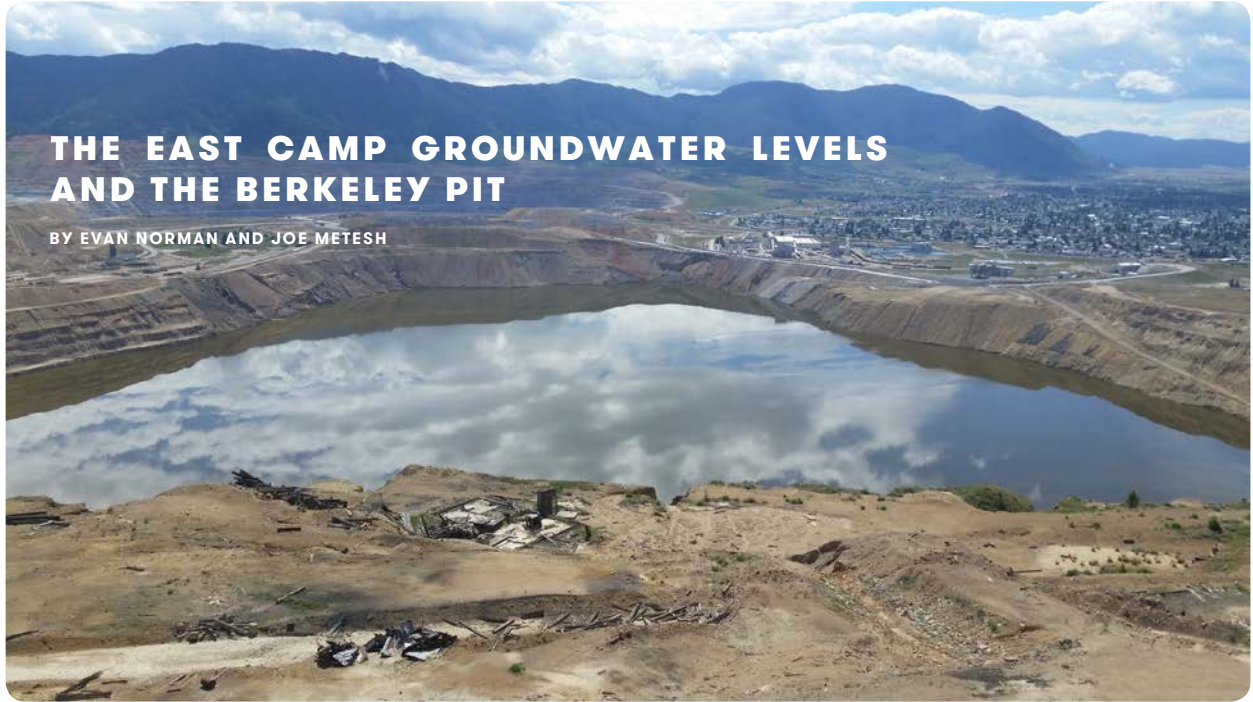
The word root of remediation is *remedy*, implying the same meaning as 'cold and flu remedy' when applied to medicine. In this example, the remedy is given to the injured or sick person to help lessen symptoms, but the remedy does not 'cure' the disease. In the case of environmental actions, the remedy is often to remove or contain the contamination. Remedial actions are designed to be protective of human health first; and the remedy does not guarantee a return to a natural or 'before injury' condition.

Remedy does not require an area to be returned to a natural condition that is self-sustaining. Rather, remedial actions prescribe monitoring and maintenance forever. This monitoring is designed as a check-up to ensure that the measures taken to protect human health and the environment are maintained. Examples of remedies in Superfund sites can vary between capping and covering, as in our Butte Hill, to fencing out hazards and requiring that land areas not be utilized, as in nuclear waste sites. Remedies may involve removal of the wastes and disposal to a repository where feasible. For example, at Milltown Dam, part of the remedial actions completed by the EPA were removal of tailings that deposited behind the dam. Those tailings were relocated to the repository at Opportunity, MT. Also at Milltown Dam, there are areas of tailings that were capped and covered since removal was impractical.

The Natural Resource Damage Program (NRDP) worked in collaboration with the EPA and completed restoration activities at the Milltown site. NRD followed the EPA's removal activities with stream channel reconstruction and native plant revegetation of the flood plain and riparian zone. The restoration activities at Milltown built upon and improved the remedy, ensuring that the Milltown ecosystem functions normally.

THE EAST CAMP GROUNDWATER LEVELS AND THE BERKELEY PIT

BY EVAN NORMAN AND JOE METESH



THE BERKELEY PIT REFLECTING THE SKY WITH THE ACTIVE CONTINENTAL OPEN PIT MINE IN THE BACKGROUND. TOGETHER, THE BERKELEY PIT AND THE EAST CAMP GROUNDWATER FLOODING COMPRISE THE BUTTE MINE FLOODING OPERABLE UNIT (BMFOU). PHOTO BY: CFWEP.ORG

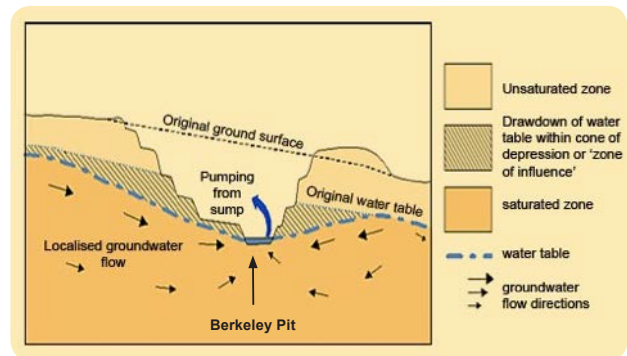
N**A**TURAL CRACKS, OR FISSURES IN THE BEDROCK, of the Butte hill and 10,000 miles of open mine workings define the way groundwater, surface water, and underground rocks and minerals interact. The mining process increased our aquifer storage capacity by 13% due to the creation of the shafts and stopes that are now able to store underground water. Water in the mine shafts is not safe as drinking water due to high mineral content and sulfuric acid, which is generated when iron pyrite, which is present in the ores, is exposed to oxygen and water during the mining process. In order to ensure human health, the EPA established the Butte Mine Flooding Operable Unit (BMFOU) and enacted a controlled groundwater area for Butte. Protective measures include monitoring of the water levels in the Berkeley Pit and adjacent mines, as well as not allowing residents to utilize groundwater wells for drinking water.

For approximately 100 years, the Butte hill was being dewatered by pumping to keep underground shafts dry for mining. The shafts below the Berkeley Pit took 18 months to fill when the pumps connected to the Kelley Mine shaft were shut off in 1982. The pit continues to fill up today which gives a picture of how much volume the pit can hold compared to adjacent mine shafts and the bedrock aquifer. The flow rate into the East Camp system was estimated to be as high as 7.6 million gallons per day (mgd) in 1988. As of 2012, the flow rate was 2.46 mgd, contributing to the 3,100-foot rise of the water table level throughout the mine shafts and eventually into the Pit.

The Berkeley Pit creates a sink or basin, also known as a cone of depression. The Pit, naturally fills with groundwater draining from the surrounding mine shafts. Once the pumps were turned off in the Kelley, the water began to return to the historic groundwater table, as shown in the figure at right. As can be seen, the Berkeley Pit is the lowest level in the East Camp Bedrock System.

As of May 3, 2016, the water level in the Pit was 5,333.98 feet which is 76.02 feet away from the 'critical water' level of 5,410 feet. The Critical Water Level was established to prevent toxic water from spreading outward and infiltrating nearby shallow aquifers, most importantly the Blacktail/Silver Bow Creek aquifer. It is projected that the Critical Water Level will be reached at one of the compliance points, likely at the Anselmo or Pilot Butte, before reaching 5,410 feet in the Pit. Even if the Critical Level is reached, the 1994 Record of Decision set the Critical Level at a point where it is projected that the water would not spread beyond the Pit, even if the level rose another 50 feet.

This buffer ensures that the groundwater flow will be directed toward the Pit. Without the buffer in place, the two water levels would eventually become equal, which would allow for underground flow between Silver Bow Creek and the contaminated ground waters. Mandated pumping and treatment of the Berkeley Pit water, which is expected to start in 2023, ensures that Silver Bow Creek is protected from groundwater contamination from the BMFOU.



REPRESENTATION OF GROUNDWATER MOVEMENT FROM DEWATERING EFFECTS.

Montana Bureau of Mines and Geology (MBMG) scientists track groundwater movement in the East and West Camp systems, in 70 different well locations, mineshafts, and two surface water sites. The 1994 EPA Record of Decision states the extent of the contaminated groundwater is 918 billion cubic feet or approximately 26 billion cubic meters, which is equivalent to an area 68 times larger than the Berkeley Pit.

REFERENCES:

- Cone of Depression. Retrieved from: http://www.sustainableaggregates.com/sourcesofaggregates/landbased/water/water_opsstage_page2.htm
- Montana Bureau of Mines and Geology Environmental Studies. Berkeley Pit & BMF Operable. Accessed June 17, 2016. Updated 2016. <http://www.mbm.mtech.edu/env/env-berkeley.asp>.
- United States Environmental Protection Agency. (1994, September) EPA Superfund Record of Decision Silver Bow Creek/Butte. Helena, MT: Region VIII Montana Office.

GRAPHIC CREDIT: http://www.sustainableaggregates.com/sourcesofaggregates/landbased/water/water_opsstage_page2.htm

MEGA SITES OF THE CLARK FORK WATERSHED

CLARK FORK RIVER BASIN OPERABLE UNIT (BPSOU) OU8

The Clark Fork River Federal Superfund Project is making great progress as cleanup moves forward with multiple phases to start construction and contamination removal in fall 2016 and spring 2017. Over 1 million cubic yards of tailings have been removed and placed in the regional repository. Vegetation is being restored along the Clark Fork River from Lodge county downstream to Garrison in Powell County. Cleanup is on-going and expected to be completed by 2020.

MISSOULA



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MILLTOWN DAM SUPERFUND SITE, looking east. Constructed in 1907, the Milltown Dam, located just west of the Clark Fork and Blackfoot River confluence, was removed in 2008, for multiple reasons. Among them, the removal of toxic mine sediments lying at the bottom of the dam's reservoir. Shown here, (circa 2008-09) the Clark Fork River waters flow through the bypass channel (at left) as workers dig up sediments that are loaded onto railroad boxcars (at right) to be dumped at BP-ARCO Repository in Opportunity, MT.

SILVER BOW CREEK/BUTTE AREA

BUTTE MINE FLOODING OPERABLE UNIT (BMFOU) OU3

This OU includes contaminated groundwater in the flooded underground mine workings below the city of Butte, along with the contaminated water in the Berkeley Pit. The remedy selected for this OU includes water treatment at the Horse Shoe Bend Water Treatment Facility. This treatment plant adds lime to the water to precipitate out heavy metals. The heavy metal sludge is discharged to the Pit, and the clean water is used at Montana Resources. Should the mine not be able to use the treated water, it will then be discharged to Silver Bow Creek. The discharged water will be constantly monitored and must meet strict water quality standards. This site will be maintained in perpetuity. (See page 7 or pitwatch.org for more information).

WEST SIDE SOILS OPERABLE UNIT OU13

This OU includes the mining-impacted areas in and around the city of Butte that are not included in the BPSOU or the permitted active mining area. This OU was not included in the last five-year review. A sitewide protectiveness statement will not be issued until construction of the remedy is complete at all OUs. **The Superfund process has not been initiated for this operable unit.**

ROCKER TIMBER FRAMING & TREATING OPERABLE UNIT OU7

This OU includes soils and groundwater contaminated with arsenic from a former timber treating facility. Continued protectiveness of the OU7 remedy requires ongoing monitoring; continued implementation of institutional controls (policies that are mandated through local ordinances, such as restrictions on well drillings); site access controls; updated conceptual site model; and operation and

This is the Diamond Mine with example of non-remediated areas in background. The Top of the World Trail System and grass-covered areas in foreground are examples of remedy within the BPSOU.



SILVER BOW CREEK

→ LOWER AREA ONE



GROUNDWATER CAPTURE TREATMENT SYSTEM

MONTANA POLE AND TREATING

This site, noted in purple above, is not a part of the Upper Clark Fork Superfund Mining Complex. It is its own Superfund site because the damages are not mining related.

Noted in purple above, this site consists of an abandoned 40-acre wood treatment facility that operated from 1946 to 1983. Soils and groundwater are contaminated with pentachlorophenol, diesel fuel and dioxins. The remedy has consisted of bioremediating soils and treating the groundwater with carbon filtration. The soil clean-up is nearly complete and that portion of the site will be considered for re-use. Groundwater treatment will continue for at least 50 years, until standards have been met.

BUTTE PRIORITY SOILS OPERABLE UNIT (BPSOU) OU8

Noted in yellow above, this OU includes impacted soils, mine wastes, and contaminated attic dust located within portions of the city of Butte. It also includes mining-impacted alluvial groundwater and surface water associated with the historic and current Silver Bow Creek floodplain within the city of Butte. To ensure protectiveness, remedy implementation must be completed and municipal stormwater contributions to Silver Bow Creek must be addressed. **Currently in Consent Decree negotiations.** The site will be required to be maintained in perpetuity.

YANKEE DOODLE TAILINGS POND

BERKELEY PIT

CONTINENTAL PIT (ACTIVE)

DALY

EXCELSIOR

GRANITE

MONTANA

MAIN

IRON

SILVER BOW CREEK

SILVER BOW CREEK

BLACKTAIL CREEK

CONTINENTAL

OPERABLE UNIT

stream. By the end of this summer, Phases 1, 2, 5 and 6 will be complete, 2017. To date, over 8.2 miles of river have been cleaned up and over 1.5 million is coming back strong in the remediated areas and a variety of wildlife are using 43 miles of the Clark Fork River from Warm Springs in Anaconda/Deer to take 10-12 years.

>>

THE MIGHTY CLARK FORK River, just outside of Missoula, MT, as it flows through a healthy riparian area that includes tall, shading trees that keep waters cool - a necessary quality for trout. This healthy riparian vegetation also helps prevent erosion of soils and supports biodiversity of plants and wildlife.



ANACONDA COMPANY SMELTER OPERABLE UNITS

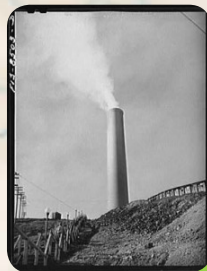
THE ANACONDA COMPANY SMELTER SITE IS 300 SQUARE MILES.

COMMUNITY SOILS OPERABLE UNIT OU16

The remedy for residential soils, selected in 1996 and modified in 2013, included removal of arsenic-contaminated soils and replacement with clean soil. This remedy also called for the cleanup of future residential soils through institutional controls. The remedy for commercial/industrial areas and the active railroad area included placement of engineered covers. Construction of the remedy was finished in 2010. Operation and maintenance activities are ongoing. The 2013 modification to the Community Soils remedy included cleanup of lead-contaminated residential soil; expanding the institutional controls program; and development of an interior dust abatement program. Implementation of this remedy began in 2015 and is ongoing. Currently in Consent Decree negotiations. The site will be required to be maintained in perpetuity.

OLD WORKS / EAST ANACONDA DEVELOPMENT AREA OU7

The remedy, selected in 1994, included placement of engineered covers over waste; treatment of soils; surface water controls; upgrades or repairs to stream-bank levees; replacement or repairs to bridges; institutional controls; long-term monitoring; and preservation of historic features. OU7 consists of six subareas. Construction is complete at five of the six areas. Construction at the sixth area, the Industrial Area, is nearly complete. The site will be maintained in perpetuity.



ANACONDA

MILL CREEK OPERABLE UNIT OU15

The remedy, selected in 1987, included permanently relocating all Mill Creek residents; removing demolition debris and contaminated soils for later disposal; regrading and replanting areas disturbed by relocation/demolition activities; monitoring and maintaining the vegetation; and controlling access to the area. Construction of the remedy finished in late 1988. The site will be maintained in perpetuity.



ANACONDA REGIONAL WATER, WASTE AND SOILS OPERABLE UNIT OU4

The remedy, selected in 1998 and modified in 2011, included consolidation of miscellaneous waste materials; placement of engineered covers over waste management areas; treatment of contaminated soils; stormwater controls; and institutional controls, including the monitoring and regulation of domestic wells in groundwater areas. A Technical Impracticality Waiver for arsenic in groundwater has been applied to large areas of this site. This OU consists of 15 subareas. Remedial action is ongoing at most of the subareas. Over 10,000 acres have been remediated to date. Construction is expected to be completed over the next 10 years. **Currently in Consent Decree negotiations.** The site will be required to be maintained in perpetuity.

FLUE DUST OPERABLE UNIT OU11

The remedy, selected in 1991, included stabilization of 316,500 cubic yards of flue dust; placement of the treated materials in an engineered repository; long-term maintenance and monitoring; and institutional controls. The remedy required that the repository include a liner; leak detection and collection system; groundwater monitoring wells; and a cap. Construction of the remedy finished in September, 1996. The site will be maintained in perpetuity.

WARM SPRINGS PONDS (WSP) ACTIVE AREA OU4 & WARM SPRINGS PONDS INACTIVE AREA OPERABLE UNITS OU12 (PART OF BUTTE/SILVER BOW CREEK AREA)

This OU includes the portion of the 2,600 acre WSP that actively treat the entire flow of Silver Bow Creek prior to its confluence with Warm Springs Creek, forming the start of the Clark Fork River. It also includes the reconstructed Mill-Willow Bypass. Continued protectiveness of these OU remedies require remedy implementation progress at other upstream OUs. **Currently Interim ROD in place; will have Final ROD after Silver Bow Creek and BPSOU are complete.**

STREAMSIDE TAILINGS OPERABLE UNIT OU1

This OU includes the 26-mile, mine-waste impacted Silver Bow Creek floodplain. Continued protectiveness of the OU1 remedy requires completing implementation of the selected remedy, which is currently under a maintenance program. Trails and recreational amenities are currently being constructed by the Greenway District. This work is nearly complete, as is the greenway trail. Will be maintained as a recreational corridor.



BUTTE

Superfund is Super Messy

BY ABBY PELTOMAA AND RAYELYNN CONNOLE

SUPERFUND IS THE FEDERAL PROGRAM DESIGNED TO PAY for the cleanup of toxic waste areas in the United States. The Superfund program has been responding to the worst hazardous waste sites and managing the cleanup of these sites since 1980. The program is intended to protect human and environmental health. A Superfund site is the toxic waste area that is required by law to be cleaned. The Environmental Protection Agency (EPA) founded on December 2, 1970, is the government agency that oversees the Superfund program. The "super" fund was a special trust fund created by a tax on petroleum and chemical companies under the Carter Administration; this tax expired in 1995 under the Clinton Administration. The fund paid for cleanups when a viable responsible company could not be identified.

As of May 13, 2016, there were 1,328 active Superfund sites, 55 proposed sites and 391 deleted sites. According to a 2014 National Geographic article, one in six Americans lived within three miles of a Superfund site. Each Superfund site has its own unique story – one that people in this watershed understand all too well. We decided to delve a little deeper into the beast that is Superfund and quickly found out that Superfund is super messy.

THE 1970s



LOVE CANAL SUPERFUND SITE, NIAGARA FALLS, NEW YORK

Congress established the **Resource Conservation and Recovery Act (RCRA)** in 1976 to control hazardous waste from its inception until its disposal after concern of 'midnight dumping', or the illegal disposal, of toxic waste. That same year, Congress passed the **Toxic Substances Control Act**. The EPA was given the authority to "protect public health and the environment through controls on toxic chemicals that pose an unreasonable risk of injury."

Even with the passage of these laws, a couple of major incidents involving toxic waste gained national attention. In 1977, a series of chemical reactions ignited an explosion at the Rollins Environmental Services plant, a large chemical-waste treatment facility in Bridgeport, New Jersey. The explosions left six dead and hospitalized 35.

In 1978 and again in 1980, President Carter declared a State of Emergency at the Love Canal site located in Niagara Falls, New York. Love Canal would eventually become the nation's first Superfund site. What was supposed to be a means of generating cheap hydroelectric power to fuel the industry and homes of a new city by digging a short canal between the upper and lower Niagara Rivers, turned into a dumpsite for over 21,000 tons of hazardous waste. In 1953 the owners and operators of the property covered the canal with earth and sold it to the city. A few years later, about 100 homes and a public school were built in the area near the covered dump site. In 1978, 82 different compounds, 11 of which were suspected to cause cancer, were found to be percolating upward through the soil despite having been dumped in waste-disposal drums. These compounds were leaching into the backyards and basements of the homes and the public school. President Carter declared the State of Emergency after an alarming increase in skin rashes, miscarriages, birth defects, increased rates of cancer, and other health problems. Love Canal again highlighted the seriousness of waste dumping and the possibility of hundreds of other chemical dumpsites across the country. Major bills were introduced in 1979 to create a 'superfund' for dealing with the dangers posed by toxic waste dumps after House and Senate committees held hearings.

THE 1980s



CLARK FORK RIVER SUPERFUND SITE, MONTANA

Thick black smoke and ash hung over a 15-square mile area in Elizabeth, New Jersey after toxic waste burst into flames at a waste storage facility in 1980. The fire burned for 10 hours and residents were urged to stay inside and schools closed as well. In response to the dangers of abandoned or uncontrolled hazardous waste dumps, such as that at Love Canal, Congress passed the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)** in 1980. CERCLA or 'Superfund' was developed as a nationwide program to manage emergency responses including: information gathering and analysis; establishment of liability for responsible parties; and site cleanup. A trust fund, or Superfund, was also created to finance emergency responses and cleanups. Superfund was funded by "polluter pays" fees from companies that, as a rule, generated hazardous wastes. For example, oil and chemical companies were taxed evenly to set aside funds for Superfund. This tax was levied on all potential polluters regardless if the companies were indeed responsible for release of hazardous chemicals.

In 1982, the first major Superfund settlement was reached for the Bluff Road Superfund site. In this settlement it was established that the 12 industries who helped generate the wastes were to pay \$1.6 million to implement the cleanup at the South Carolina Recycling and Disposal site.

The environmental justice movement was also birthed this year after a protest at a landfill in Warren County, North Carolina. Protestors raised concerns over unequal distribution of environmental threats in minority and disadvantaged communities. The environmental justice movement continues to the present day. Also in 1983, 406 sites were listed on the EPA's first **National Priorities List (NPL)**. These sites were classified as the nation's priorities for cleanup under Superfund, qualifying them for long-term remedial actions funded by Superfund. The NPL included sites such as Times Beach, Missouri, where 500 residents were permanently relocated due to widespread dioxin contamination. Dioxins are a group of chemicals that are often bi-products of paper and herbicide production. Dioxins are troublesome in the environment due to their long persistence and food chain accumulation. Closer to home, sites such as Silver Bow Creek/Butte Area, Anaconda Smelter, and the Milltown Reservoir /Clark Fork River were listed in response to mine waste contamination. Also in 1983, the State of Montana filed its complaint for injuries to and loss of the State's natural resources in the Upper Clark Fork River Basin against Atlantic Richfield Company following their closure of mining operations in Butte.

Congress enacted the Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act (RCRA) in 1984 after concerns about hazardous chemicals from storage tanks and landfills leaching into groundwater. This Act required the EPA to make efforts to prevent this contamination, such as requiring groundwater monitoring wells near disposal sites as well as treatment of hazardous waste prior to burying underground.

In 1984, 3,800 people were killed at a Union Carbide Plant in Bhopal, India from release of methyl isocyanate gas in one of the world's worst industrial disasters. Exposure to this toxic gas caused instant death and blindness in many cases, as well as premature death for many thousands more. Many children were born with physical and mental birth defects following the gas release. The Emergency Planning and Community Right-To-Know Act was passed in 1986 as a result of the devastation that the residents of Bhopal experienced. This Act required companies to list the chemicals, their uses, and hazards that were being used at any given site.

In 1986 the **Superfund Amendments and Reauthorization Act (SARA)** was passed by Congress. The Act strengthened CERCLA's enforcement provisions; encouraged voluntary settlements instead of litigation; stressed the importance of permanent remedies and innovative treatment technologies; increased state involvement in every phase of the Superfund program; increased the focus on human-health problems posed by hazardous waste sites; and encouraged greater citizen participation in how sites are cleaned up.

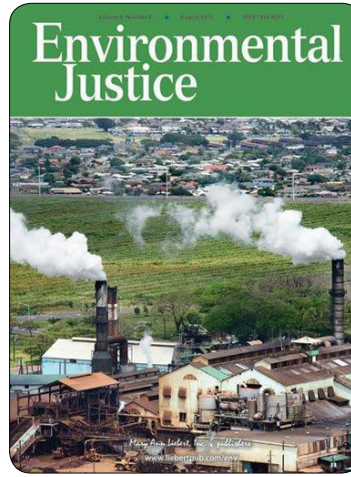
On March 24, 1989, public consciousness about oil-spills was once again raised when the Exxon-Valdez oil tanker hit the Bligh Reef and spilled 11 million gallons of crude oil into Alaska's Prince William Sound. The spill impacted approximately 1,300 miles of shoreline and covered 460 miles from the Bligh Reef to the village of Chignik on the Alaska Peninsula, as well as impacting Prince William Sound's fishing industry. Due to the contact with oil, upwards of 300,000 animals died including otters, many types of birds, bald eagles, orcas, and countless fish. Thirty years after the disaster, the National Oceanic and Atmospheric Administration (NOAA) reported that 21,000 gallons of crude oil still pollutes Prince William Sound.

The **Enforcement First Policy** was introduced by the EPA in 1989 to prioritize the finding of 'potentially responsible parties' (PRPs) in order to hold polluters responsible for the damages they created.



EXXON-VALDEZ CRUDE OIL SPILL, PRINCE WILLIAM SOUND, CHIGNIK VILLAGE, ALASKA PENINSULA

The **Oil Pollution Act** was passed in 1990, establishing a tax-based compensation trust fund, which made the costs of oil pollution cleanup the responsibility of the oil-handling industry.



THE JOURNAL OF ENVIRONMENTAL JUSTICE

In 1994, the EPA created the **Office of Solid Waste and Emergency Response (OSWER) Environmental Justice Task Force** to address the fact that disadvantaged and minority communities carry greater burdens from environmental threats. This task force is mandated to address this unequal distribution of burdens among communities. After the bombing of a federal building in 1995 in Oklahoma City, which killed 168 people, the Superfund emergency response program was expanded in order to help prevent and prepare for biological, chemical and nuclear terrorist attacks.

2000 TO TODAY



LIBBY ASBESTOS SUPERFUND SITE, LIBBY, MONTANA

In 2000, cleanup plans were completed for the Hudson River to remove over 100,000 pounds of PCB's to protect the river and public health. The Hudson River Superfund encompasses 200 miles of river and riparian areas. This site is one of the largest in the country, comparable to the Upper Clark Fork River Basin Superfund site. Current cleanup involves dredging and removal of PCB-laden sediments that deposited in the river bottom over a 30-year period.

In 2004 the first Superfund site listed, Love Canal, was delisted after 21 years of cleanup and almost \$400 million spent. The toxic wastes were either removed or contained in one area using a synthetic liner, clay cap, and a drainage system that collects and treats water runoff. The area was revitalized and new homeowners moved into 260 renovated homes. The area east of the canal was sold for industrial and commercial redevelopment.

In 2007, a bankruptcy settlement was reached between the EPA, the U.S. Department of Justice and W.R. Grace and Company. The settlement gave the EPA **\$34 million for 32 W.R. Grace sites in 18 states** tied to past and future cleanup costs at sites contaminated by vermiculite, asbestos and other hazardous substances. Libby and Troy, Montana, are among the sites contaminated by the vermiculite and asbestos and were listed in 2002.

Residents of Picher, Oklahoma, and other towns nearby started to move out of their town after the Tar Creek Superfund site was damaged by a tornado. The EPA provided \$8 million for the buyout and relocation of the residents. Throughout Superfund history, most buyouts have been for significantly less than original property values.

In 2009, **\$1.79 billion was paid to fund environmental cleanup and restoration through a bankruptcy reorganization of American Smelting and Refining Company LLC (ASARCO)**. The money is used for payment of past and future costs at more than 80 sites in 19 states contaminated by mining operations.

Also in 2009, Public Health Emergency was issued at Libby, in response to the public health impact from the asbestos site. Immediate medical assistance was launched to residents who had or may have been exposed to asbestos.

British Petroleum's (BP)'s Deepwater Horizon oil rig exploded off the coast of Louisiana in 2010. Eleven workers were killed and millions of gallons of oil were spilled into the Gulf of Mexico. EPA responded to public health and environmental concerns. The Obama Administration created a **\$20 billion Deepwater Horizon Oil Spill Trust** to pay individuals and businesses suffering losses from the disaster. This trust does not cover claims for cleanup costs or natural resource damages.

SUPERFUND TAX EXPIRES

The authorization to collect 'polluter pays' fees expired in 1995 when Congress did not renew the tax, despite President Bill Clinton's Administration proposing to renew the fees. This non-renewal was followed by the George W. Bush Administration that opposed the reinstatement of the 'polluter pays' fees. In 2003 the Superfund program ran out of money and the financial liability of paying for cleanup of sites with no PRPs fell to the American taxpayers. From 2010 to 2015, \$1.26 billion of taxpayer money has been allocated to the Superfund program. However, funding for Superfund has continually decreased and has resulted in the reduction in the number of sites cleaned. While President Barack Obama's Administration supports the reinstatement of the fees, Congress has prevented the reinstatement.



TAR CREEK SUPERFUND SITE, PICHER, OKLAHOMA

CURRENT STATUS OF SUPERFUND

Due to decreased funding, and in turn, the slowdown of cleanup of Superfund sites, the future of hundreds of abandoned toxic waste sites remains unclear. What is clear, is the increased exposure and health threats to communities across the country. According to Beins and Lester (2015), Superfund was created "on the principle that those companies most closely associated with creating toxic waste sites and generating hazardous waste should bear the financial burden of cleaning them up." There is currently not enough money to cleanup abandoned sites. Should the financial burden for orphan sites without a viable responsible party fall to taxpayers or should Congress reinstate the Superfund tax? Should existing companies be taxed to clean up orphan sites, even if those companies are not directly responsible? How do we create a balance between the need for industry and the need to protect our health and natural resources?



ILLUSTRATION CREDIT: DAVE HUTCHINS, BT LIVERMORE & OLIVIA EVERETT

WHAT IS THIS WASTE FROM?

THE PARROT SMELTER OPERATED FROM 1881 TO 1899 NEAR WHERE THE BUTTE CIVIC CENTER STANDS TODAY. SMELTER TAILINGS HIGH IN COPPER AND OTHER HEAVY METALS WERE DUMPED INTO SILVER BOW CREEK AND LATER BURIED UNDER LAYERS OF FILL MATERIAL.



BY THE NUMBERS:

PARROT TAILINGS: 25 acres, average thickness 10 feet, contains 2 million pounds of copper and 1 million pounds of zinc

NORTHSIDE TAILINGS: 5 acres, average thickness of 5 feet, contains 2.2 million pounds of copper and 6.6 million pounds of zinc

DIGGINGS EAST: 2 acres, average thickness of 5 feet, contains 700,000 pounds of copper and 880,000 pounds of zinc

BLACKTAIL BERM: 5 acres, average thickness of 5 feet, contains 440,000 pounds of copper and 467,000 pounds of zinc

THE TOTAL AMOUNT OF WASTES LEFT IN PLACE within the floodplain equals 60 acres up to 10 feet thick. The total amount of copper totals 5.3 million pounds, while zinc totals 9 million pounds. The groundwater recovered from wells in the Parrot tailings area is highly toxic: cadmium occurs at 800 times the drinking water standard; copper at 750 times the standard; lead at 7 times the standard; zinc at 96 times the standard; and arsenic at 10 times the drinking water standard. The groundwater capture remedy (MSD subdrain system) captures 20 pounds of copper per day. Based on the conservative estimate of 5.3 million pounds of copper within these wastes, the subdrain system will take 700 years to remove all the copper within this system. Since the wastes are located within the floodplain and continually leach into the groundwater, there is a perpetual threat to recontamination of Silver Bow Creek. The State of Montana through the Natural Resource Damage Program has spent \$130 million to restore Silver Bow Creek downstream from these wastes. What happens 100 years from now when the PRP's have cashed out but the threat to the restored Silver Bow Creek is still in place?

BUTTE-SILVER BOW AND SUPERFUND

BY MATT VINCENT, BUTTE-SILVER BOW CHIEF EXECUTIVE

Among the myriad of conversations currently occurring around Superfund in the city of Butte, it is important to remember that Superfund is not only a policy issue, but a significant element of Butte-Silver Bow's daily operations. Superfund-related work touches programs across Butte-Silver Bow departments including the Health, Planning and Public Works Departments.

Butte-Silver Bow has received funding from Atlantic Richfield to maintain remedy on the Butte Hill, monitor its performance annually, and operate programs to ensure protectiveness. Four programs divisions are in place to do this work:

- Residential Metals Abatement Program
- Mine Waste Caps and Storm Water Facilities: Operations & Maintenance
- Municipal Storm Water System Capital Improvements
- Institutional Controls: Storm Water Ordinance, Water Quality District/Controlled Ground Water Areas; Excavation and Dirt Moving Permits; Records Management and GIS.

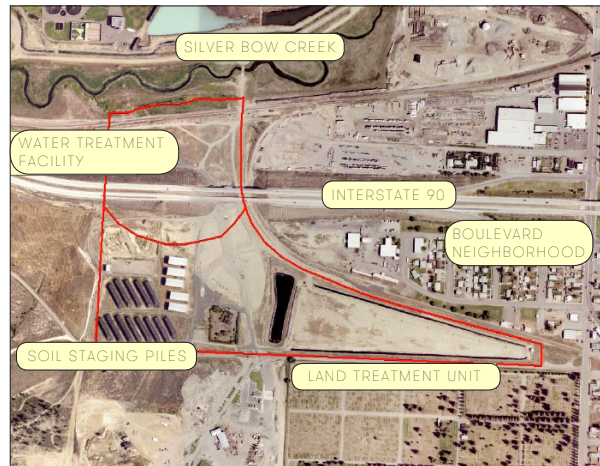
Related activities – along with a host of individual cleanup projects already implemented on the Hill and in the creek corridor – have been ongoing for the past 20 years.

The Residential Metals Abatement Program is perhaps the most important activity associated with the Butte Hill cleanup, and is the most directly related to human health. Initiated in 1992, the RMAP program began as a pilot project to address all potential sources of lead – including mining operations, interior and exterior house paint, water pipes, house dust and soil – and minimize exposure to lead. The program, based upon the initial 1995 program, still operates today offering education through outreach, conducting residential assessments and abatements, monitoring and tracking work completed. This program has resulted in decreases in blood lead levels exceeding safety guidelines.

The Mine Waste Caps and Storm Water Facilities Program monitors 178 reclaimed sites and 32 engineered storm water structures throughout the Butte Hill to ensure problems that may compromise cap effectiveness and storm water flow are addressed by maintenance crews. The Clark Fork Watershed Education Program (CFWEP.ORG) independently evaluates the sites annually and provides BSB with quantifiable feedback which drives maintenance work. In addition, a full-time inspector performs routine checks, and a field crew monitor the sites and regularly fix any problems that arise between CFWEP-led evaluations.

In addition to Superfund-related storm water infrastructure, several areas of the municipal storm water system on the Butte Hill are monitored and repaired to ensure they are properly capturing run off, conveying storm water to the Metro Treatment Plant, or if storm water issues are identified, new inlets are constructed to aid in the process. These capital improvements along with storm water permits, storm water controls on construction sites, and other programs contribute to environmental protectiveness.

Finally, Butte-Silver Bow captures the data related to monitoring, maintenance, and permitting to ensure that these activities are documented and reported to regulatory agencies. This process involves quantified data storage in databases, filing paperwork with the land records office, and maintaining digital files in Arc GIS. This mapping software enables BSB to make maps of areas, documenting where, why, and what type of work has occurred. Future work that is necessary across the Hill is also identified. Maps and data assist Butte-Silver Bow staff in decision making and allow the city to work in partnership with the Federal Government, State of Montana, and Atlantic Richfield to protect human and health and the environment.



MONTANA POLE AND TREATING PLANT UPDATE

BY JENI FLATOW

DEQ and EPA are close to wrapping up the 2016 5-year review for the Montana Pole and Treating Plant (MPTP). This review will be the fourth 5-year review the agencies have completed. Previous MPTP 5-year reviews have provided valuable feedback that has enabled DEQ to continue monitoring treatment approaches in an efficient manner, ensuring the project's progress. The intent of the 2016 review is to detail the effectiveness of the remedial (clean-up) techniques being undertaken and to identify any deficiencies that need addressed.

The anticipated release of the 5-year review is the end of September 2016, after which the document will be publicly available. Aspects of this review process include: technical assessment; data collection; interviews; site inspections; and other pertinent activities. Based on the findings of the review, conclusions may include the identification of potential issues; recommendations and follow-up actions; and determination of whether the current remedy is, or is expected to be, protective of human health and the environment.

The final removal of treated soils and placement into a secured area is under design. DEQ has much work to do to ensure that the design for the final cap, which will be placed over the treated soils, is protective of human health and the environment, including preventing the potential leaching of any remaining contaminants to groundwater. The designed cap will mitigate potential exposure to contaminants by eliminating exposure pathways. Since ingestion is the primary pathway by which the MPTP contaminants become a threat to human health, placing a cap over the contaminated soils and maintaining the integrity of the cap has been determined to be an effective protective measure.

BUTTE CITIZENS TECHNICAL AND ENVIRONMENTAL COMMITTEE

FROM BUTTECTEC.ORG

UNDER THE SUPERFUND LAW, the EPA can award one Technical Assistance Grant (TAG) for each Superfund site. TAGs allow communities to hire independent experts to help them interpret technical data, understand site hazards, and become more knowledgeable about the different technologies used to clean up sites.

The Citizens Technical and Environmental Committee (CTEC) serves the Butte area through the TAG program. The mission of CTEC is to help people living in the Butte-Silver Bow area understand and respond to complex technical information related to the area's environmental problems, in order to enable them to participate in a meaningful manner in local, state, federal and industrial deliberations regarding solutions to these problems.

CTEC's vision is of a clean and healthy environment in Butte achieved through an informed and engaged citizenry and Butte's public servants. CTEC works to educate the general population through the assembly, analysis, interpretation, translation and dissemination of environmental information, and to listen to their questions, fears, needs, desires and opinions. CTEC holds monthly meetings to develop and effectively convey community-based recommendations, advice and criticism, independent of government or industry-based special interests, to include both consensus and dissenting views about particular issues.

CTEC also works to inform the public about the Residential Metals Abatement Program (RMAP). If you live in a home or apartment built before 2006 in Uptown/Central Butte, your home, apartment or yard may contain contaminants. Elevated levels of metals can threaten your health or the health of your children. Arsenic, lead and mercury can cause cancer, nervous system disorders, learning disabilities, heart problems and other health issues. Children are particularly at risk from exposure to arsenic, lead and mercury.

RMAP is a free and easy way to have your home tested and cleaned of metals. The Butte/Silver Bow Health Department's RMAP staff will sample and analyze dust and soil at your home and clean it up, if needed, at no cost to you. The program cleans up contaminated attic dust, indoor dust, and yards.

HOW IT WORKS:

Fill out a sample request form, which is available on Butte Silver Bow's website (co.silverbow.mt.us). If you are a renter, ask the property owner to help with this. After this is completed, Butte-Silver Bow Health Department will come to your home and collect attic dust, indoor dust and soil samples. They will have a certified lab analyze the samples to see if contamination is present. They will mail the results to you or the property owner. All results are confidential. If you don't have a level of contamination that requires cleanup, no action will be taken. If the Health Department finds elevated levels of lead, mercury or arsenic contamination, cleanup is required in order to protect your health.

The county program removes both mining-related and non-mining-related sources of lead (such as lead-based paint and piping) and other contaminants. The county has implemented the program since 1995, and will continue the program until all homes are clean. While previously focused on lead, in recent years the program has expanded to address other contaminants of concern, particularly mercury and arsenic.

For more information on this program, call Chad Anderson at 406-497-5040 or Brandon Warner at 406-497-5022 at Butte-Silver Bow County Health Department. You can also contact CTEC for assistance:

PHONE: (406) 723-6247
E-MAIL: BUTTECTEC@HOTMAIL.COM

**WE HOPE THIS PUBLICATION HAS BEEN HELPFUL YOU,
BUT IF YOU STILL HAVE QUESTIONS...**

**ASK A LOCAL
EXPERT**



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CFWEP.ORG WOULD LIKE THANK OUR SPONSORS FOR THEIR GENEROSITY AND SUPPORT

ABBY PELTOMAA AND STUDENTS ON CLEAN UP BLACKTAIL STREAM (CUBS) DAY 2016



IMAGINE BUTTE RESOURCE CENTER



VOICES OF THE WATERSHED

CFWEP STUDENTS SPEAK

AT THE END of each of our field trips, we remind our students of their responsibility to be stewards of their watershed by reminding them of the following quote by Dr. Seuss from *The Lorax*.

“UNLESS SOMEONE LIKE YOU CARES A WHOLE AWFUL LOT, IT’S NOT GOING TO GET BETTER, IT’S NOT.”

Following this exercise, we ask our students to reflect for us about what they will do to be stewards, asking the question,

“What legacy do you want to leave for future generations?”

This year we added to our presentation, letting students know that key decisions about our watershed were being made during the on-going consent decree negotiations. We asked our older students to write something they wanted the decision-makers to consider in planning. We asked our younger students to write down one thing they wanted to tell the scientists. The following quotes are a few of their responses and are representative of the many responses collected throughout this school year.

I want to ask the scientists, why not just do restoration for everything? Shouldn't we try to have the best possible clean-up?

I want to go to college at Tech. I hope that I can keep learning about better ways to mine and learn how to develop better solutions for mining waste and other environmental problems. I want to tell the decision-makers not to settle for less than an excellent clean-up. We have the best engineers and scientists right here at Tech.

When I grow up, I would like to see more natural (native) trees on the Anaconda hills. I would tell the scientists to plant more trees and make more trails.

I plan to teach my children and my children's children and so on about how important it is to keep our streams clean. I will help on clean up days every year.

I AM GOING TO TELL EVERYONE I KNOW THAT IT IS NOW OUR TURN TO KEEP THINGS CLEANED UP. WE HAVE WAY TOO MUCH GARBAGE IN THE STREAM.

I WOULD LIKE TO SEE BUTTE HAVE REALLY COOL PLACES TO BIKE AND WALK TO WHERE YOU CAN HANG OUT WITH FRIENDS, KIND OF LIKE MISSOULA'S TRAILS BY THE RIVER. IT WOULD BE GREAT TO HAVE COFFEE SHOPS AND RESTAURANTS ALONG THE TRAIL BETWEEN THE CIVIC CENTER AND THE CHAMBER. WE NEED MORE TREES THERE, TOO.

I WANT TO TELL THE SCIENTISTS TO KEEP DOING THE GOOD WORK AND LET'S TRY TO RESTORE MORE AREAS.

I WOULD ASK THE DECISION-MAKERS TO THINK ABOUT BACK-FILLING THE BERKELEY PIT. WHY NOT JUST PUT THE TAILINGS THERE RATHER THAN CREATING A MUCH LARGER TAILINGS DAM?

I would like the decision-makers to think long-term. Our watershed needs to be vital and healthy for many generations. It isn't really practical to keep monitoring and/or fixing forever. We should strive to make the ecosystem as natural and sustainable as possible. We also need mining and the jobs it creates. We need to make sure we keep mining in balanced ways.

I LIKE THAT WE HAVE MORE RECREATIONAL OPPORTUNITIES HERE IN BUTTE. I HOPE THAT WHATEVER IS DECIDED FOR THE PARROT AND DIGGINGS EAST, WE KEEP DEVELOPING MORE OPEN SPACES. IT WOULD BE GREAT IF THERE WERE SMALL BUSINESSES THERE TOO. OH, AND WE NEED MORE BENCHES WITH SHADE TREES BECAUSE THAT TRAIL IS HOT.

I WANT TO ASK THE SCIENTISTS WHY MORE PEOPLE AREN'T AWARE OF HOW IMPORTANT IT IS TO TAKE CARE OF THE WATER? WHY DO PEOPLE KEEP POLLUTING WHEN WE KNOW BETTER?

I want to tell the scientists to think of better ways to get the rest of the land and water back to normal (or as close as possible). Is there anything we are doing now that will negatively affect the water in the future?

I think we have to plan long-term. Butte and Anaconda are significantly damaged by the historic mining. Our areas need good planning for business development so our communities can grow like Missoula and Bozeman. I want to stay after college, but I am not sure I will be able to get a good job here. I would like to tell the decision-makers to think about community planning. We have to get over the era of Superfund.

I want to tell the scientists, Thank You. Thank You so much for caring about our watershed.