# THE LEGACY OF BUTTE MINING

BY
Carrie K. Boettger
GEO 422 Winter Term
Ronald Doel
22 Mar 01

Pristine rivers, lush watersheds, abundant wildlife and beautiful forests are some the aspects that make the state of Montana “the last best place on Earth.” The calming quietness of the open plains and the excitement of the mountains pose as an invitation to many outsiders to come and explore the beauty that Montana has to offer. The state motto, “The Treasure State”, is directly reflective of Montana’s environment. In the eyes of many, Montana is a sanctuary for city folk to enjoy the clean fresh air, the pure water and inspiring scenery. But often times, reality is lost through the words of persuasion. As any other state, Montana has its faults. The state is not free of pollution, crime, economic problems and most of all environmental degradation. Topics such as these escape the magazines, travel guides, headlines and history. Today Montana is facing on of its largest environmental battles, to restore and reclaim the city of Butte.

Butte, one of the largest mining camps in the world is recovering from a century of environmental damage. More than a century of primitive and destructive techniques of hard rock mining and smelting resulted in environmental damage from the Continental Divide to Milltown Dam 120 miles downstream. For decades Butte was renowned as "The Richest Hill on Earth," and for many, Butte is famous for being the upstream end of the largest Superfund area in the country. After a century of environmental damage, the story of the last decade has been the greening of Butte. Today, dramatic results can be seen every spring as more and more land that was once covered with eroded mine waste turns green. While efforts continue to preserve the history of mining and smelting in the area so it is never forgotten, equally vigorous efforts are being pursued to reclaim and restore land in the Butte area damaged by past mining and smelting.

The history of Butte is as rich as its natural resources. The complex connections between man, environment, money, livelihood and survival, is an intricate part to the story of Butte mining. The

complexities of the human spirit and emotion add twists and often roadblocks in deciphering the effects of mining operations on man and the environment. The relationship that man has with the environment has changed dramatically over the past century. This intriguing concept is the reason that in the present, there are so many environmental issues surfacing. The past does catch up and is clearly seen in the condition of the environment.

Deciphering the story of Butte mining and the impact it had on the environment is detailed, elaborate and most importantly an intense synthesis of various factors. With an enormous amount of information available, the story of Butte is able to slowly unfold. Beginning as uncharted territory scattered with Native American tribes, to the first trench of quartz's leading to the booming mining economy, and presently to the 20th ranked superfund site in the world, Butte has had changes in image as well as in the environment. The effects of mining on the environment are clearly seen. The compliance to allow such atrocious acts to occur however is not. Butte, prior to the mining era to present, has been altered almost beyond recognition. With the aid of historical and scientific methods a timeline can be developed and the reconstruction of this historical landscape can be seen and begin to evolve.

Initial research began with the general pre-history and history of Montana and most importantly the city of Butte. Information was then gathered from a wide range of resources. Material was obtained from national and state archives, to the cities historical society. Personal accounts and recollections of the area, authentic written evidence and ever-useful photographic history were all used to develop, inspire and provide a wealth of information to the topic. These resources with their strengths and weaknesses added to the energy and depth of the topic. With a firm understanding of the past and historical processes, the present day information could then be used in conjunction with the past

to provide answers to the major environmental concerns that the city is now facing.

In order to understand the present day information about the environment, a concise understanding of the past is necessary. The sharp contrasts of topography in Montana are evidence of a sometime turbulent geologic past. From the spine of the Rocky Mountains in the west to the rolling plains of the east, Montana encompasses a wide range of topographic features. During a dramatic geologic period, culminating about sixty million years ago, the mountains of western Montana were formed by massive shifts of the earth's surface and the explosive spurting of lava through volcanoes and fissures.

Ancient seas rose and fell, covering at various times all of today’s Montana, leaving behind fascinating geologic formations and sedimentary deposits of limestone, phosphates, and many other compounds. Great swamps formed east of the mountains and were later buried to become coal and oil fields. It was through processes of these that Montana was blessed with rich minerals and natural resources. But it wasn’t until man that these resources were exploited and had the potential to do harm.

The general area of concentration for this research is the western half of the state. Western Montana embraces the major United States share of the Northern Rocky Mountains, a broad series of crosscutting and interlaced mountain chains generally running northwest to southeast. Butte is located in the heart of the Rocky Mountains in the southern half of the state. Two major tributaries of the mighty Columbia River drain northwestern Montana. Draining the larger portion of western Montana is the Clark Fork River, which gathers its headwaters near Butte-Anaconda, and then flows northwesterly through Hellgate Canyon east of Missoula. The drainage pattern and headwaters at Butte plays a very important role in the future years of mining and continue also through the present.

Native Americans have resided in North American at least twenty thousand years ago, since the Bering land bridge. Traditional origin stories told by Montana Indians, the descendants of the earliest people in the region, tend to support this early date, but claim that the ancestral people as having always been part of this continent. Climate changes, causing movements and adaptations of the native people, required them to move south through Canada and into Montana. Archaeologists have found evidence of prehistoric habitation in Montana as early as thirteen thousand years ago. As climate and the environment changed, they adapted successfully, relying on a variety of hunting and gathering techniques.

Nearly five hundred years ago, when Europeans first invaded North America, over five million Native Americans lived in a variety of cultural groups throughout what is now the United States. One such cultural group, the Shoshoni Indians, inhabited the desert-mountain regions south and west in Montana since the late seventeenth century. The Butte area was home to Shoshoni Indians along with the Blackfeet and Pend d'Oreille tribes. They were all mainly hunter-gathers until the arrival of whites. Beginning in 1823 up to 1870, Indians were removed from their lands and put onto reservations. It was then that the original Native American way of life came to an end and white domination of Montana began. (1)

The first whites to come to the Montana territory were Lewis and Clark. Members of the Lewis and Clark Expedition, who traversed the area in 1805-6, wrote the first recorded descriptions of Montana and its indigenous people. What Lewis and Clark described was a land of dramatic landscapes; practically the image of what later Americans would call wilderness. The harshness beauty of the region impressed the explorers, who remarked on the richness of natural resources they saw. The portrait of this country, drawn on maps and described in exploration journals nearly two centuries ago, has undergone massive revision, most

importantly in its natural environment.

The next whites to enter the area came only months after the Lewis and Clark party. They were traders looking for furs and pelts. Fur trading was a prosperous business, but mining proved to be the real “money maker” of Montana. The first recorded discovery of gold occurred in the spring of 1858 when placer gold deposits were found at gold creek near present day Drummond. This sparked the beginning of the mining era. By mid-1862, general conditions favored a major gold rush to what is now Montana.

The first recorded acknowledgment of the Butte hill and its peculiarities predate the mining frontier. Caleb E. Irvine, an associate of a trading establishment, often frequented these areas enroute to trade with the Crow and Shoshoni Indians. In the spring of 1856, Irvine and a trading party camped along what became known as Town Gulch later renamed Dublin Gulch, a suburb of present day Butte. They found a “trench”, which had been dug into exposed quartz on the soon-to-be-famous Original Lode of the Hill. Elk antlers were found near by and had evidently been used as gads to dig the hole. Whether this excavation was the work of Indians or of wandering whites remains an unanswerable question; but few ever doubted Irvine’s story, as he lived in Butte for many years and enjoyed a solid reputation. The exact richness of the Butte hill would not be apparent until several years later. (2)

Prospectors first struck gold in Silver Bow Creek, present day Butte in 1864, and gold seekers hastily erected huts and storefronts that housed the highly transient population of miners, merchants, prostitutes, and traveling performers. When the gold played out, just about everyone left. In 1875 when William L. Farlin began mining and reducing silver ore, another rush to the valley occurred. Metallic wealth had lured men to the arid summit valley of southwestern Montana, situated more then a mile high in the northern Rocky Mountains. Settlers named a distinctive volcanic cone in the valley’s northwest

corner “Big Butte” and a granitic, thousand-foot rise to its east “the Hill.” The hill was a treasure trove worth billions of dollars in gold, silver, zinc, lead, manganese, and above all, copper.

Silver turned Butte into one of the half-dozen richest metal mining districts in the United States. The Governments demand for the metal to back currency and mint coins guaranteed a booming economy between the mid-1870’s and early 1890’s. With silver came a sense of permanency and the railroad. Residents platted a townsite in 1876 and incorporated their community as Butte City in 1879. With the repeal of the Sherman Silver Purchase Act in 1893, the nation’s silver market collapsed. However, this did not slow down mining in Butte, because Butte grew from a heart of copper.

Butte’s fortune had been wedded to copper since 1882 when Marcus Daly discovered “the largest deposit of copper sulphide that the world had ever seen” at the three-hundred-foot level of the Anaconda Mine on the Butte hill. The vast, rich reserves of copper in the Hill ultimately distinguished Butte from other western mining camps and turned it into the world’s largest producer of the red metal until the late 1920’s. Copper, filling a new demand created by the electrical revolution, fueled Butte’s rise to a major city of the Rocky Mountain West. (3)

Every form of mining involves damage to the environment, especially in the 1800’s to early 1900’s. Certain types of placer mining added mercury to the sluice to gather the gold by amalgamation. The mercury would be washed down stream to eventually destroy the streams ecology and environment. It is important to note that mercury has now been identified as a hazardous substance and should only be used under controlled conditions and not released into the environment. Hydraulic mining involved the use of high-pressure hoses that could blast away whole stream banks and beds. The water separated the earth from rocks and carried it through a long series of sluices. This direct

attack on the stream banks would forever alter the ecology and environmental productivity of the watershed. Most types of placer mining resulted in massive amounts of silt to be flushed into the stream and altering the natural habitat for fish and other wildlife and disrupting the natural flow of the river. Placer mining was relatively environmentally friendly when compared to underground and pit mining but most of all the smeltering process of the ore. (4)

In order to reduce the ore to a useable state, the ore must first be smelted. To accommodate this process, many smelters began to spring up in the Butte area. With the erection of the first silver mill in Butte, the production soon began for the first smelter. Ore was almost useless without a smelter to reduce the minerals. A smelter is a facility that melts or fuses ore, often with an accompanying chemical change, to separate its metal content. Emissions cause pollution. "Smelting" is the process involved. The wealthy economy of Butte at the time did not come without some cost. The emissions from the smeltering plants are unimaginable today. The mining era saw no regulations on pollution or even health standards. It seems that the people did not have a clear understanding of the environment and its processes. They simply seemed to look past the pollution from mining and were only able to see the profit.

Since the city of Butte was erected around the mines, homes and business were neighbors to many of the mines. The people lived, shopped and played around the mines. The fouls smelling sulphurous fumes spewing from smelters or floating from open heaps of roasting ore repulsed travelers to the burgeoning metropolis in the 1880s. Many visitors were also astounded by the stark desolation and ugliness of the place, and by the incredible air pollution caused by open roasting and unregulated smelting of its ores. Novelist Dashiell Hammett depicted Butte as “...an ugly city of 40,000 people, set in an ugly notch between two ugly mountains that had been all dirtied up by mining.” The smoke,

heavily laden with sulfur and arsenic, arose not only from the smelter furnaces, but even more so from the open roasting of ores.

Local mining companies would dump the sulfide ores either in giant stalls or in pits of up to a block in size, pile in logs for fuel, and then burn them for days upon end to eliminate as much of the sulfur as possible. Mining engineer J. B. Steiger described the result: “The ore treated in Butte every twenty-four hours gives off from 260 to 300 tons of sulphur.” The wind direction had a large impact on the amount of pollution that swarmed the city. If the usual westerly winds blew, the smoke blew away with minimal problems. But during inversions and easterly airflows, it created an appalling situation. Ominous clouds hung low over the hill, so dense that darkness enveloped the city in midday and lamps had to be lit. According to the *Engineering and Mining Journal* in January 1893, “...the unfortunate traveler from South Butte traces his way not by landmarks, for these are utterly invisible, but by the hacking cough of his forerunner, who though a few feet away is completely veiled in smoke.” (5)

Historical drawings of Butte are not complete without puffy billows of mine smoke. Many of the drawings that are found in historical books and in archives depict Butte as either a very cloudy city or one that is doomed with smoke pollution, the latter seems the more logical case concerning Butte. Dense smoke compelled residents to walk the streets with sponges or rags tied over their mouths and noses, carrying lanterns to find their way in the middle of the day. In an article published in the *Montana Standard* in 1932, Ann Pentrilla remembered that the byproducts of mining had a horrible cosmetic effect. She recalled that “your face would be pitted from the chunks of sand” blown from tailing piles. Capitalist and a “Copper King” William A. Clark claimed healthful benefits from the smoke. He asserted that the fumes were a disinfectant that killed germs and that the measure of arsenic in the smoke gave Butte women their beautiful, pale complexions.

Eventually many citizens began to disagree with Clark's opinion about the smoke. The smoke caused some deaths, many illnesses, vomiting, and nosebleeds. A nurse in a Butte hospital recalled that all the miners would return home form the mines with green teeth, due to the highly toxic air inside mine shafts. Public opinion backed by the press finally launched a "smoke war" in the early 1890's, which led to an anti-roasting ordinance and the installation of abatement devices on most smelters. The smoke problem did not really subside until the early part of this century, when the consolidation of the Hill led to the transfer of almost all smelting to Anaconda and Great Falls. (6)

Miners consumption is the popular name for silicosis among miners in the United States. Silicosis is a prolonged and often-fatal illness caused by the inhalation of silica particles, or mine dust. It is death by slowly wasting away. In a 1921 public heath survey of Butte miners, 42 percent of the study's volunteers were found to have miners consumption. In 1942, of 267 active reported cases of silicosis in Montana's fifty-six counties, 173 were from Butte (Silver Bow County). The effects of mining touched everyone in the community. Many of the children claimed slag heaps as their playgrounds. Children of the mining era speak fondly of those days of digging in the silty yellow-brown soil that left their skin stained. Tailings are clearly seen in pictures from the late 1800' through the mid to late 1900's. White particles dominate the ground cover surrounding mines, smelters and the surrounding area. It was as if winter snow remained all year long. (7)

If the effects of mining were having such a large impact on human organisms, then they must have been having the same adverse effects on the natural environment. Since there were no environmental regulations placed upon mining and smelting operations, the companies discarded of the waste the cheapest way they knew how; by disposing of it out their front door. Smelters would drain highly toxic chemicals out into the street. Tailing piles are still seen today around Butte, most notably

in and around riverbanks. Jim Ledford, a miner who lived in a cabin below the Anaconda mine, noticed that mine water was running through discarded cans and iron junk made the metal disappear and left a heavy sludge. He was curious and had the sludge assayed. It was 98 percent pure copper. He got a one-year contract for water flowing from the mine and earned $90,000. The amount of chemicals poured directly into the environment is beyond calculation, but the effects were seen in the environment. (8)

The water supply of Butte was and still is today highly polluted. A Butte resident growing up during the peak of the mining era recalls that as a child she would play in copper ponds. Up the street from where she lived, was a pond of mine water. She remembers getting into trouble by her mother because when she returned, the only thing left on her jeans were the brass little pieces of buttons, and the pants just got eaten alive, and so did the tennis shoes. Water such as this was freely flowing throughout the streets of Butte and being soaked up by the earth and eventually entering the water table. (9)

The smoke not only harmed humans it also harmed vegetation. According to the *Anaconda Standard*, only four trees remained alive in 1890. Gertrude Atherton wrote, “They [smelters] ate up the vegetation, and the melting snows and heavy June rains washed the weakened earth from the bones of the valley and mountain, leaving both as stark as they must have been when the earth ceased to rock and began to cool...” The area surrounding Butte became bear and desolate. Sparse vegetation, mostly sagebrush, dotted the landscape. Mountains and hills around Butte were well timbered. Mines needed tremendous amounts of timber to make stulls, braces and other support systems. There were about 10,000 miles of tunnels underground, and Butte timber was the support structures. Lumber was also used extensively by the smelters and roasting. Massive amounts of timber were needed as fuel for these processes. It was noted that logging for mining depleted the timber and

smelter fumes finished the job. (10)

The mentality of Butte residents is almost incomprehensible. The massive amount of health and environmental problems seemed on the bottom of their concerns. It is difficult to understand their logic concerning the environment. They did understand pollution, toxins and the amount of damage they were doing. The west was new uncharted territory. Natural resources were plentiful and never ending. If things dried up, then they could move to a new sight and enjoy the richness of the new soil. Perhaps the *Butte Miner* expressed the majority's mindset when it declared, "The thicker the fumes the greater our financial vitality." Possibly their mindset may have been different if they could see into the future and see what their 'financial vitality' would be spent on; environmental clean up. (11)

Since the conditions of living in Butte were almost inhospitable, W.A. Clark, owner or part owner of 46 mines, opened a sanctuary in the country for the Butte people. In 1899 Clark purchased land at the foot of the Rockies and established Columbia Gardens. In a smelter-ridden city, the people needed it. He loved to host festivities at Columbia Gardens. Clark charged no admission at his park, encouraging citizens of Butte to come and enjoy the beauty. There were bands, carnivals, parties and excitement all the time. It seems ironic that a Copper King such as Clark would provide a sanctuary for the miners and their families. Much could be read into his intentions of developing the Gardens, such as he was compensating for the poor living environment that he partially produced in the city, or making the miners happy so they would stay and work in the horrible conditions of the mines. The importance of the Columbia Gardens is to understand that the people had to leave the city for clean air, green vegetation, and pure water.

Columbia Gardens would soon be consumed by the mining industry. In the early 1950's, the Anaconda Mine Company no longer found it profitable to underground mine. In its stead, pit mining became

popular. It was in 1953 that the Berkeley Pit began its operations. The pit slowly chewed away at the hill, devouring suburbs of Butte including Columbia Gardens, Dublin Gulch, Parrot Flat and Meaderville. Open pit mining in the Berkeley Pit continued until the early 1970's. (12)

It was in the early 1970's that environmentalism became a national and state phenomenon. Four factors account for the movement. First, the establishment of the Environmental Protection Agency (EPA) in 1970. Montana created a similar structure in 1971 when legislature approved the Montana Environmental Policy Act (MEPA). Unlike other agencies, MEPA seeks to prevent degradation of existing environmental quality instead of cleaning up existing pollution. Second, the state constitution of 1972, created at the height of the environmental movement, explicitly sanctions environmental protection. "All persons are born free and have certain inalienable rights," the constitutions reads. "They include the right to a clean and healthful environment..." Article IX of the state constitution is devoted entirely to the "Environment and Natural Resources" and begins, "The state and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations."

Third, committees of concerned citizens were formed, as Montanans perceived potential threats to their environment. In fact it was quite possibly the city of Butte that, upon seeing the growing cavity of the Berkeley Pit, inspired the constitutional provision, "All Lands disturbed by the taking of natural resources shall be reclaimed. The fourth factor that spurred the environmental movement was an overall spirit of appreciation that moved across Montana. Montanans began to understand the distinctiveness of their state, the magnificence of the mountains, the vastness of the rolling plains, and its simple beauty. Through these actions, Montana is recovering from its somewhat polluted past. The Berkeley Pit is Butte's main concern with the contamination level rising. (13)

In 1982, the central pump station in the Kelley Mine was turned off. For nearly a century before 1982, groundwater under the Butte hill had been constantly pumped to the surface to allow for mining. When the pumping stopped, the Pit started working like a big sink, drawing water toward it from all directions. The pit water is very highly polluted because of acid mine drainage, which is mainly caused by the high sulfur content in the rock in the Butte hill. The sulfur reacts with air to become sulfuric acid. As the acidic water flows through the underground mine workings and rock fractures, its eats away at the metals in the rocks and dissolves them into the water. The depth of the water in the pit is currently 702 feet plus 200 feet of sediment at the bottom. The water rises on average 1 foot per month, and current water level is at 5,175 feet above sea level, and the critical water level is 5,410 feet above sea level.

The Berkeley Pit is currently ranked 20th on the National Priority Superfund List of Superfund Sites and has been listed since 1983. The National Priority list contains over 1,200 Superfund sites. Over 3,500 miles of mine tunnels lie underneath Butte, and the groundwater aquifer contains over 70 billions gallons of contaminated water. An article in the *Montana Standard* has documented that it is inevitable that a serious earthquake will occur in Southwestern Montana, and there are numerous cracks and fissures, which could also lead to a discharge. In addition, the underground mine flooding is the largest mine flooding that has ever taken place in the world. The water is so polluted and contaminated that 342 Canadian Snow Geese perished in the Pit in 1997. There is fear of contamination of groundwater and of the aquifers in the near future. The concern of contamination is heightened by the fact that the headwaters for the Columbia River begin at Butte. (14)

Since the consolidation of the Anaconda Mine Company in the early years of this century, the environment around Butte has slowly begun to green. According to Gertrude Atherton, “...Since the smelters have gone

to Anaconda, patches of green, of a sad and timid tenderness, like the smile of a child too long neglected, have appeared between the sickly grey boulders of the foothills, and in Butte, lawns as large as tablecloth have been cultivated." Since the spawn of the environmental movement, much concern has been placed on revegetation of mining areas in Montana. (15)

The University of Montana at Missoula has done extensive research into revegetation and restoration of mountain streams. In a research effort, U of M concentrated on restoration of mine tailings. They worked on past mining areas that have been inactive for more then 70 years, yet remain bare of vegetation and contribute metal laden acid drainage to otherwise pristine mountain streams. Replicated field and laboratory studies were undertaken to assess how various surface treatments influence site revegetation and metal mobility in mine tailings of an abandoned lead mine. There are currently over eight thousand no responsible party abandoned mine sites in western Montana about 30% of which reside on federal land. Many of these sites are abandoned gold, lead and copper mines that involved the mining and processing of sulfide minerals. The formation of fine textured mine tailings in the processing of the ores creates a high surface area that enhances the oxidation of sulfide minerals to sulfate creating a highly acidic substrate in which little or no vegetation is established and subsurface drainage and overland flow contribute metal laden acidic drainage to neighboring riparian areas. An inexpensive and efficient means of site restoration is needed to allow establishment of native vegetation and reduction of subsurface movement of metals at these sites.

Current reclamation practice for most acid mine sites in Montana is limited to lime applications, to neutralize the acidity of surface soils, and seeding with native grass species. Vegetation establishment on limed tailings is greatly limited by lack of plant nutrients and reduced microbial activity. The research team concluded that it is

clear that lime and compost applications alone or in combination are effective in reducing metal mobility and enhancing restoration of mine tailings. Amendment of tailing with lime or compost allowed for the initiation of vegetative growth on the tailing piles at some of the sites since their deposition. (16)

The days of open-air smelters are long gone and significant progress has been made to restore the land and water to how it was more than a century ago. It is clear that since the old practices of mining have ceased, their environmental impact continue to persist. Steps have been taken to revitalize the damaged environment. It will take time, money and research, but there has already been dramatic improvements. The Berkeley Pit is Butte's number one priority and most severe environmental problem. For where there once were towns, mills, mines and a green haven, now acid laden red water sits, waiting to unleash its powers. Although there is no final decision as to what treatment the Berkeley Pit will endure, the only proven, cost effective treatment method is adding lime. Lime would clean the water by reducing its acid content and pulling out the metals. But this process would generate 500 to 1,000 tons per day of heavy metal sludge, creating a huge waste disposal. It seems as if the ugly processes of degradation are hard to stop once it has been in control. (17)

The mining legacy of Butte will continue far into the future. Stories will be told about the days of the mining camps and the massive amounts of metals that were mined from the "Richest Hill on Earth." New stories will now have to be added to Butte's legacy, those of contamination, vegetation loss, and most importantly that of the Berkeley Pit. It is the hope of all Butte's citizens and that of Montana that future stories will tell of revegetation, re-growth, purity and the day the Pit was cleaned up. As for the present, Butte is now recovering from a century long battle against the environment, a battle which the environment lost. Slowly Butte is becoming "Butte-iful" once

again.

Large-scale community projects aimed at reclamation are now underway in Butte. The Greenway, is a multi-million dollar trail system planned between Butte and Anaconda, and will provide access to the outdoor recreational attractions of the Clark Fork River drainage and the surrounding mountains. The Copperway Heritage Trail is a park concept aimed to emphasize and promote the mining and smelting heritage of the Butte/Anaconda area. The Blacktail Greenway is a walking path and bike trail that follows the north bank of Blacktail Creek and has become a wildly popular attraction for locals and visitors alike. The Butte Gardens is a community effort driven by the desire to revitalize East Butte by returning an amusement park and gardens to emulate the once famous Columbia Gardens Amusement Park that was sacrificed to the expansion of the Berkeley Pit in the 1970s. These are a few of the projects that are currently underway in Butte. It won't be long until the city is back to its once pristine state. As many Butte citizens will tell, there is a lesson learned in every venture, only some are more detrimental and damaging then others, and Butte citizens should know. Looking back, there are many actions that should have been stopped, or changed, but the past in this case will not clear up the future. Time is better spent in the present and looking forward to the future for answers to the environmental problems that Butte is now facing as a direct result of the past. Thus, the mining legacy of Butte continues and the end perhaps it is not over the rainbow, but over "The Richest Hill on Earth." (17)

Bibliography

Andrews, Suzanne. “Butte Silver-Bow Public Archives.” <http://sweetgrass.mtech.edu/silverbow/archives.htm> (28 February 2001).

Barrett, Evan, and Pam Haxby-Cote. “Butte Local Development Corporation.” Butte Montana Community Profile. <http://hosts3.in-tch.com/www.buttemontana.org/envir.htm> (12 February 2001).

Boettger, Wade. Interview by Carrie K. Boettger. 1 March 2001.

DeLuca, T.H., and E. L. Lynch. “Treatment of Mine Tailings to Reduce Mobility and Encourage Restoration of a Mountain Stream in Montana.” Watershed Restoration Management, July 1996: 499-508.

Finn, Janet L. Tracing the Veins. Berkeley: University of California Press, 1998.

Fritz, Harry W. Montana Land of Contrast. Woodland Hills: Windsor Publications, Inc., 1984.

James, Don. Butte’s Memory Book. Caldwell: The Caxton Printers, Ltd., 1975.

Malone, Michael P. The Battle for Butte. Seattle: University of Washington Press, 1981.

Malone, Michael P. The Montana Past An Anthology, ed. Richard B. Roeder, Missoula: University of Montana Press, 1969.

Malone, Michael P., Richard B. Roeder, and William L. Lang. Montana a History of Two Centuries. Seattle: University of Washington Press, 1991.

Malone, Michael P., Richard B. Roeder, and William L. Lang. Montana a History of Two Centuries. revised ed. Seattle: University of Washington Press, 1997.

Murphy, Mary. Mining Cultures. Chicago: University of Illinois Press, 1997.

Outback Ventures. "Butte America.Com" Q&A. <http://www.butteamerica.com/> (7 March 2001).

Plessas, Don Jr., and Sharon Paul. "Copper City". <http://www.coppercity.com/> (20 February 2001).

Plessas Web Design. "Butte Chamber, Visitor and Transportation Center." Butte Info. <http://www.butteinfo.org/> (12 February 2001).

World Museum of Mining. <http://www.miningmuseum.org/> (9 March 2001).

## Notes

1. Michael P Malone, Richard B. Roeder, and William L. Lang. Montana a History of Two Centuries. revised ed. Seattle: University of Washington Press, 1997, 1-17.

2. Michael P. Malone, The Battle for Butte. Seattle: University of Washington Press, 1981, 7.

3. Mary Murphy. Mining Cultures. Chicago: University of Illinois Press, 1997, 2-3.

4. Malone, Roeder, and William, 71.

5. Malone, 62-63.

6. Murphy, 4.

7. Janet L. Finn. Tracing the Veins. Berkeley: University of California Press, 1998, 185-186.

8. Don James. Butte's Memory Book. Caldwell: The Caxton Printers, Ltd., 1975, 20.

9. Finn, 185-186.

10. Malone, 62-63.

11. Murphy, 4.

12. Don Plessas Jr., and Sharon Paul. “Copper City”. <http://www.coppercity.com/> (20 February 2001), Pit Watch.

13. Harry W Fritz. Montana Land of Contrast. Woodland Hills: Windsor Publications, Inc., 1984, 126-127.

14. Pit Watch.

15. Malone, 62

16. T.H. DeLuca, and E. L. Lynch. “Treatment of Mine Tailings to Reduce Mobility and Encourage Restoration of a Mountain Stream in Montana.” Watershed Restoration Management, July 1996: 499-508, 499-506.

17. Pit Watch.

18. Evan Barrett, and Pam Haxby-Cote. “Butte Local Development Corporation.” Butte Montana Community Profile. <http://hosts3.in-tch.com/www.buttemontana.org/envir.htm> (12 February 2001).