return.

Such were the very human mechanics of failure, which Safford evokes as skillfully as he does the technological, geographical, and economic dimensions of his story. Within a few years a visitor to the once bustling Midas mill site found that "grass grows in the great yard and bats are flitting at night through the offices." What had gone wrong?

Safford suggests a number of answers. Certainly the district's early promoters had, deliberately or not, exaggerated the richness of its ores, a mistake exacerbated by the widespread faith that ore always improved with depth. Sheer ignorance of conditions in Montana played an equal role. Any careful business man, then or today, would be shocked that Ward and his backers failed to realize and anticipate the vastly inflated costs they would pay for everything from transportation to labor to food in an isolated region like Montana.

Ultimately, though, Safford's tale suggests their greatest error was initial over-capitalization and over-building, followed by a panicked tightening of the purse strings and demands for immediate profits. Eastern capitalists, eager to dominate the district by being first on the scene, invested vast sums in mills to process ores from deposits whose extent and richness had yet to be proven. Like the transcontinental railroad promoters who would soon lay hundreds of miles of track well in advance of actual demand, so the Midas and other Hot Spring companies erected mills in the misplaced confidence that suitable ore would soon materialize to feed them.

The Mechanics of Optimism should win a wide readership. Historians of mining in the American West will find the book indispensable, but there is also much to interest historians of technology, business historians, and a general audience seeking to better understand the mining frontier. The book's one weakness is that Safford clearly prefers writing straight historical narrative to engaging in broader theoretical analysis. Yet this is a minor issue, and those interested in applying recent analytical insights from geography, the history of technology, and even environmental history will enjoy teasing out some of the broader implications of Safford's meticulous research. Indeed, that there is so much here that deserves further discussion testifies to the historical depth and originality of the book.

Timothy J. LeCain
Montana State University.

Pete J. Dunn. ***Mine Hill in Franklin and Sterling Hill in Ogdensburg, Sussex County, New Jersey: Mining History, 1765-1900.*** Alexandria, VA: Dr. Pete J. Dunn, 2002-2005; 7 volumes, 1102 pages, paper, $75. (Available only from the Sterling Hill Mining Museum, Ogdensburg, NJ, or the Franklin Mineral Museum, Franklin, NJ.)

Several historians have researched and recorded the legal disputes and intrigue of famous mining districts such as Butte, Montana, or the Comstock Lode in Nevada. In this seven-volume series, Dr. Pete J. Dunn has accepted the challenges of a similar investigation concerning the world-class zinc deposits of Franklin and Sterling Hill, New Jersey. The culmination of some twenty-five years of research on the subject, this documentary study is broad in scope and rich with details.

Dunn, a mineralogist with the Smithsonian Institution, published a fine monograph concerning Franklin and Sterling Hill in 1995 that focused on the rich mineralogy of the two zinc mines. These localities feature hundreds of mineral species, many of them rare and fluorescent, which is why Franklin is known as the "Fluorescent Mineral Capital of the World." In that work Dunn included a limited historical section drawn from secondary sources. To tell the eighteenth- and nineteenth-century history, this new series draws heavily on primary documents such as

deeds, court cases, early mining company prospectuses, correspondence, and many other types of sources. In fact, the author so greatly appreciated the assistance from librarians and archivists over his years of research, that he partly dedicates this study to them. Any reader or researcher of mining history understands the necessity for access to good source materials.

This reviewer found a number of the topics covered to be of great interest. Dunn includes history of the iron industry of Franklin Furnace and how it pertained to the geology and early ownership of the zinc deposits. He also relates the rise of the zinc industry during the mid-nineteenth century to the development of superior zinc paints as a substitute for hazardous lead paints. The evolution of the various mine openings at Franklin is aptly described and supported by a number of very helpful maps, illustrations, and historical photographs where available. I particularly enjoyed the portions of the June 2005 MHA field trip to the hidden corners of Franklin and Sterling Hill in light of what I had recently read.

Moreover, in Dunn's account a cast of characters appears, including leading principals such as Oakes Ames, James L. Curtis, Moses Taylor, the Scrantons, William E. Dodge, and Charles W. Trotter. Some of these might be considered the protagonists, whereas others and their associates were clearly antagonists, if not outright scoundrels. Prominent industrialists emerged somewhat later, as the exploitation of the zinc-iron deposits matured. The Wetherills, August Heckscher, Richard W. Parker, and Stephen S. Palmer fit into this class. Then there were men with a scientific background, including Samuel Fowler, James D. Dana, Benjamin Silliman, Charles T. Jackson, and William P. Blake. Finally, numerous practical engineers and mining men worked the ground and manufactured zinc products throughout the account.

One significant gap in any historical coverage of New Jersey Zinc—mostly likely derived from *The First Hundred Years of the New Jersey Zinc Company,* published in 1948—is the forty years of events and circumstances leading up to the Great Consolidation of 1897, orchestrated by industrialist August Heckscher. In his historical treatise, Dunn reveals many of the traits of the individuals and companies involved and the legal strategies they pursued. No longer is the Great Consolidation an untold mystery. Dunn also introduces us to the Great Franklinite Case, which initiated this period of intense litigation. For those interested in the technological aspects and development of early zinc-oxide and zinc metal manufacturing, there are plenty of worthwhile details on the operations of the Passaic Zinc Company in New Jersey, and the Wetherills' Lehigh Valley smelting works.

The introductory chapter of the series serves to enhance the reader's understanding of the series' format and the author's approach to documenting New Jersey Zinc's complex history. The final volume includes closing chapters and informative appendices covering the succession and relationships of the myriad of mining companies, biographical information on key personalities, and a helpful and comprehensive seventy-five-page general index. Dunn's cross-referencing of the many names and personalities should be very helpful to mining historians in the eastern U.S. desiring to trace connections of mining captains, entrepreneurs, and industrialists in other mining districts.

Due to the extensive scope of this subject and the documentary format in which it is presented, this history does not read like a novel. At the beginning of each volume, Dunn briefly discusses where the story concludes in the previous one, before venturing into the next phase. Some readers may find this pattern (and some repeated illustrations and legal testimony) redundant, especially if they are reading these volumes from beginning to end. But others may appreciate Dunn's efforts to periodically reacquaint the reader with the complex subject matter, without

the reader having to flip back many chapters. I frequently reexamined certain illustrations in light of the text to ensure my own proper understanding. The author admits to the speculative nature of some of his understanding of the personalities involved and their motives, but those speculations make the story all the more intriguing. What conclusion would I draw about someone's motives after a careful examination of a large set of extant legal records with its own gaps and limitations?

The author is keenly aware of the likelihood of errors of fact or interpretation creeping into his writing amidst the abundant details. References at the end of each of the thirty-six chapters indicate the sources of facts and testimonies. Despite perceiving a few inaccuracies, this reviewer is pleased that Dunn undertook this task, and certainly recommends this series. If you want to know about the origins of New Jersey Zinc from the earliest days through the nineteenth century, and how the mining landscape at Franklin and Sterling Hill relates to mining companies and historical personalities, this is the work and I know of no other. Pete Dunn leaves a detailed twentieth-century history untold. Surely, a dedicated historian should pursue that endeavor in the future.

Johnny Johnsson
Finksburg, Maryland

Harvey N. Gardiner. ***Mining Among the Clouds, The Mosquito Range and the Origins of Colorado's Silver Boom***. Denver: Colorado Historical Society, 2002; 136 pp., 40 b&w illustrations, notes, bib., ind., paper, $12.95.

In *Mining Among the Clouds*, Harvey Gardiner capably describes the boom and bust of the high altitude mines on the eastern flank of Colorado's Mosquito Range. The mining activity was located near the summits of Mount Lincoln (14,286 ft.), Mount Cameron (14,238 ft.), and Mount Bross (14,172 ft.). The elevation of the mines themselves ranged from 13,200 feet at the Lincoln Mine to 14,157 feet at the Present Help Mine, which holds the distinction of being the highest producing mine ever worked in Colorado.

Problems traditionally encountered in mining—isolation, transportation difficulties, weather conditions, and elevation—were amplified to extremes at these mines. *Mining Among the Clouds* is primarily the story of the Moose Mine. Located at 13,700 feet, this was the largest producer of all the mines in the area. The story of the Moose begins in 1868, with the discovery of an outcrop of silver at 13,600 feet on Mount Bross by Daniel Plummer and Joseph Myers, and runs through the sale of the Moose estate in 1883 at a public auction in New York City for ten thousand dollars.

The Mount Bross discovery of 1868 ignited a flurry of activity in the area, even though prospectors were initially unaware of the unusual occurrence of the silver there. This first discovery was an outcrop in a horizontal stratum of limestone, not in a fissure vein in granite. The Mount Bross find marked the first time that silver was discovered in limestone in Colorado. Here silver men began to realize that an impermeable grey porphyry, called the Lincoln Porphyry, caps the summit of Mounts Bross, and that Lincoln Limestone, or blue lime, lies immediately beneath the Lincoln Porphyry.

This limestone is brittle and soluble, with fractures and faults breaking it into fragments. As ore-bearing solutions rose to the level of the Lincoln Porphyry, the porphyry forced the solutions to spread laterally into the shatter zone, slowly dissolving and replacing the limestone. In its place, the solutions left behind silver-ore deposits of varying sizes. These deposits became known as replacement deposits, because the silver-ore-bearing solutions literally replaced the limestone.

The contact between the porphyry and the