was not going away, nor were mine keepers. They became a separate sphere from the new order as defined and delineated by the bureau's scientists.

Fors concludes that during the greater part of the eighteenth century the Swedish Bureau of Mines was admired as the cutting edge in engineering, chemistry, and mineralogy "among Europeans, and Britons, in the know" (152). However, after 1760, the bureau waned with the rise of the university center at Uppsala and its faculty, which has over-shadowed the earlier work of the bureau.

The bureau is largely unknown today because, Fors writes, later historians of science and technology saw, primarily, that seventeenth- and eighteenth-century innovation proceeded from England, and anything not connected to English technical or industrial development was ignored. The bureau was overlooked as well because mining historians focused on Freiburg and the establishment of its school of mines in 1765.

Although the focus is less on specific Swedish mines and their history, mining historians in the Americas will enjoy this close examination of some roots of chemistry, metallurgy, and the industry. The many tales in the American West of animals helping prospectors discover mines immediately bring to mind Fors' discussion of mine keeper entities. The folk tales here in the West may indeed have come from overseas along with European immigrants, a sprite in their cultural baggage. Not as important to mining historians, but significant, is Fors' success, at least to this reviewer, in elevating Sweden's Bureau of Mines to a respectable place, once forgotten, in the history of the Enlightenment.

The University of Chicago Press, as usual, has produced a good-quality book, with ten half tones of period images and artifacts. A map would have been of benefit to the reader.

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Bradley D. Snow. ***Living with Lead: An Environmental History of Idaho's Coeur D'Alenes, 1885-2011.*** Pittsburgh: University of Pittsburgh Press, 2017; xi + 275 pp., 20 b&w illus., notes, gloss., bib., ind., paper, $28.95. ISBN: 9780822964483

A twenty-first century traveler through the Coeur d'Alene mining district might be excused for not recognizing one of the greatest silver mining districts in the world or one of the most challenging environmental legacies of mining. The massive Bunker Hill smelter and zinc refinery, once a prominent feature just south of I-80, is gone. A golf course sits on old tailings and the former metallurgical site has been re-contoured and vegetated. A visitor departing the interstate at Kellogg will shortly encounter odd buildings decorated in "alpine" style with nearly illegible gothic signage. A visit to the Coeur d'Alene River downstream would reveal lush vegetation, clear water, and wildlife, but the soil under one's feet—contaminated from decades of tailings flushed down the river—might contain several percent lead and zinc.

How this all came about and how it was and is being dealt with is the subject of Bradley Snow's magnificent *Living with Lead*, which is a very apt title. When I and my colleagues at the U.S. Geological Survey studied the distribution and extent of tailings throughout the Coeur d'Alene River basin during the 1990s, we quickly realized that removing all of the lead was not possible. There was simply too much earth to move, too much habitat that would be destroyed. People were going to have to learn to live with the lead.

Fortunately, some things could be and were done. While the various mills in the district sent their lead-laden tailings into the river, the Bunker Hill smelter emitted tons and tons of lead, cadmium, sulfur, and other pollutants into the air. Lead got into the blood of locals, particularly children, mainly through ingestion of smelter dust settling in back yards and school playgrounds. Sulfur di-

oxide denuded the hills around the smelter. Thus, the main focus of Snow's history: the story of the smelter, its downfall, and the decades-long effort to remove its legacy.

The first chapter, aptly named "Uncle Bunker's Town," is a detailed history of the largest producer and employer in the district, the Bunker Hill Company, and its near-company towns Kellogg and Smelterville. These communities grew up around the mine beginning in the 1880s and, with no other major employers, were economically and socially tied to the fate of the mining company. Although Bunker Hill supplied low-rent housing, these were not company towns in the usual sense: there was no company store. But the overwhelming dependence of these communities on the mine helps frame the varied local responses over time to the environmental and health consequences of the Bunker Hill mine and smelter.

The second chapter, "Useful Metal," traces the long history of human use of lead and its associated impacts on health. Ancient Romans used lead pipes and used lead as a preservative for wine, a practice later banned by Charlemagne. Production and consumption of lead exploded with the industrial revolution and effects on the health of lead workers and lead users were severe. It took time to figure out that lead was to blame, which sets the stage for the slow recognition and mitigation of lead-related health and environmental issues in the Coeur d'Alene district.

The next chapter, "Lead Creek," explains why the Coeur d'Alene River running through the heart of the district was grey in color and lifeless. From the very beginning, local mills discharged lead-bearing tailings into the river that ultimately settled all along the river to Lake Coeur d'Alene. Legal wrangles with downstream farmers ensued, which threat Bunker Hill preempted by purchasing pollution rights and property all along the river. Ultimately, technological improvements and the Clean Water Act put an end to the discharges and the river now runs clear but is still lifeless. Efforts to mitigate the effects of these tailings are underway, as local communities "learn to live with lead."

The fourth chapter, "Foul Humours," (yes, this reviewer loves these chapter titles) examines the impact of the Bunker Hill lead smelter, built in 1917, and the zinc refinery added later. Separating lead and zinc from sulfur produces large amounts of $SO_2$ gas, which denuded portions of the national forest surrounding the mine and smelter complex. Legal wrangles with the Forest Service led to installation of early pollution controls as well as further purchases of pollution rights. The Clean Air Act forced more vigorous efforts in the 1970s, including the iconic tall smelter stacks that dominated the local landscape.

Lead smelters also produce large amounts of lead-laded dust—addressed in the next chapter, "Raining Down Poison"—that contaminated soils around homes and schools in Kellogg and Smelterville. One would think that the implications of children eating leaded dirt would have been noted and addressed earlier, but it was not until the "lead epidemic" of 1973-74 that blood testing of local children exposed the seriousness of the problem. This was the beginning of the end for Bunker Hill. The company underwent a hostile takeover by a Texas conglomerate, Gulf Resources, in 1968, and something changed in the way it dealt with environmental problems.

An independent Bunker Hill Company might have done whatever it needed to do to stay in business, but Gulf Resources seems to have had better things to do with its Bunker Hill earnings. Rather than shut down for repairs when the bag house at the smelter was damaged by fire in 1973, the smelter was allowed to continue operations, spewing unprecedented amounts of leaded dust into the local atmosphere. Gulf Resources shut the mine down as unprofitable in 1982. The next year the EPA declared the Bunker Hill area a Superfund site.

If lead was this bad for the local communities, how about the workers? The next chapter, "On Lead's Front Line," explores the varied im-

pact of lead on workers in the mine, mill, smelter, and refinery. Again, all parties involved were slow to understand and act on its ramifications for health. Bunker Hill attempted many solutions, but nothing really helped until the 1970s, when OSHA regulation led to rotating workers from high exposure to low exposure jobs to keep blood lead levels in line. The long-term impacts of lead exposure continue, with shortened life spans and chronic health issues among retired miners.

The closure of the Bunker Hill mine and smelter pulled the economic rug out from under the local communities. The last chapter, "Brave New World," describes how the town of Kellogg struggles with lost revenue and population and with the legacy of pollution. Efforts to rejuvenate the local economy include an attempted makeover as a Bavarian-themed ski village, the success of which remains to be seen.

This book is a very detailed exploration of the environmental history of a single mining district but deserves an audience well beyond Coeur d'Alene enthusiasts. The district was a big deal, with impacts well beyond its borders economically and environmentally. No other mining district has produced as much silver or likely discharged as much tailings into a river. It was a major producer of lead and smelter smoke. The district's life spans from the latter part of the industrial revolution through the environmental regulatory revolution of the 1970s and it still produces silver, lead, and zinc today. This was one of the first places where the EPA dealt with industrial-scale mining pollution. The complexity and magnitude of the problem has shaped environmental mitigation strategies ever since. No one interested in the environmental history of mining should miss this book.

One of the nice things about reviewing such a good book is that I only have to quibble with trivialities. The accidental discovery of the Bunker Hill lode by a jackass does not bear up to historical scrutiny. The lode had a very obvious outcrop that was discovered through normal prospecting when the district was first opened up. There is something strange about the human psyche that makes stories of accidental discovery of the world's major mines so attractive—the same jackass story pops up in many other places. There is also something strange about how long it took to wake up to the lead problem in the Coeur d'Alenes, especially when contemporary mitigation would have been far cheaper than the current billion-dollar clean up. Highly recommended.

Keith R. Long
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David Eilers. ***Slag and the Golden Age of Lead-Silver Ore: The Eilers Family from Immigrants to Smelting Magnates, Culminating in their 1920s Fight against the Guggenheims.*** Charleston, SC: David Eilers, 2016; 551 pp., 48 b&w illus., 4 maps, 5 append., notes, ind., paper, $25. ISBN: 9781536891812

As the subtitle of this book suggests, it is the history of four generations of a family, from first-generation immigrants to fourth-generation financial victims, written by the current incarnation of the family. The main title is a mystery until the reader finds, rather hidden away, that Karl Eilers regarded himself as "tossed like slag from American Smelting after Simon Guggenheim tired of him."

Although dealing with four generations, the first half of the book focuses entirely on Anton Eilers, who arrived in the U.S. as an immigrant in 1859, shortly after graduating from studies in mining, metallurgy, and geology in Claustal in his native Germany. Although initially finding employment in a clothing store in New York, he soon had the good fortune to meet Rossiter Raymond and find various positions assisting him in the early development of the American Institute of Mining Engineers and, particularly, Raymond's work as commissioner for the collection of mining statistics for the U.S. Treasury Department.