Bear, will slip by most readers unless they have read the introduction to the book.

Bill Hawes
Humboldt, Arizona

Matthew Kierstead. ***From Copperas to Cleanup: The History of Vermont's Elizabeth Copper Mine.*** Marlboro, NY: Milestone Heritage Consulting (www.milestoneheritage.com), 2014; 60 pp., illus., maps, paper, $15 (postpaid U.S.).

Whereas a number of articles and reports have been written about portions of the history of the Elizabeth Copper Mine in Vermont, this publication is the first to try to cover the entire two hundred-year history of the site giving balanced treatment to multiple aspects and time periods. *From Copperas to Cleanup* is comprehensive in scope, but not exhaustive in detail.

In recent decades, multiple government agencies have been involved in overseeing the study and environmental cleanup of the Elizabeth Copper Mine site in the Orange County Copper District. The U.S. Environmental Protection Agency, the Vermont Division for Historic Preservation, and the Vermont Department of Environmental Conservation signed a Memorandum of Agreement to address adverse impacts to both the known and unknown historic resources of the former mining operation. Following multiple studies, historic research, field archeological investigations, and actual cleanup work, this popular report has been completed as partial fulfillment of that Memorandum.

The agencies selected the right person to write this report, someone intimately familiar with the site and its history, knowledgeable about industrial archeology and mining and metallurgical processes, and with the research, writing, and illustrative skills necessary to do a more than credible job. Besides that, Matt Kierstead developed his passion for Vermont copper mining history through his friendship with the late Vermont mining historian Collamer Abbott that developed more than twenty years ago. The author knows his sources, both broadly and in depth, and approached this project with great care.

The author first gives the geological setting and the Elizabeth Mine's place among the three major Vermont copper mines, active primarily during the nineteenth century, in the context of the development of the broader U.S. copper industry. Certainly the general public (and probably many mining historians) does not know the term "copperas," found in the title of this work, so a generous portion of the book recounts the early focus of industrial operations at the site on mining ores to recover this chemical iron sulfate, as distinct from later copper recovery operations.

Illustrations from sixteenth- and seventeenth-century European publications by Agricola and Diderot help to clarify process descriptions from this early-nineteenth-century copperas works in Vermont, processes which had seen limited change save for some frugal Yankee ingenuity needed to make an important early chemical. Local farmers and Boston businessmen developed this red earthen Copperas Hill into the largest and longest operating manufactory of its type.

It did not take long for these men to recognize the copper value found among the ores of this massive sulfide deposit near South Strafford. By 1829 mining progressed underground and early charcoal and hot-blast copper smelting was conducted by men such as smelterman Daniel Long, overseen by Baltimore mining and chromium chemical magnate Isaac Tyson, Jr., on behalf of the proprietors, who included the Binneys and Reynolds of Boston.

The copper production was important yet short-lived during the 1830s, but it set the stage for future developments. Tyson family interests dominated mine development and copper-smelting during the final two decades of the nineteenth century, with increased capital and the adaptation and development of new technologies, including chromite refractories.

Sporadic mining and smelting episodes during the early 1900s are discussed in appropriate detail, the significance being that not many locations in the Eastern U.S. feature as many as nine distinct copper-smelting campaigns. This coverage sets the stage for the final and most significant production from the Elizabeth Mine.

Renovated and developed to provide badly needed copper during World War II, in 1943 the mine started a final fifteen-year run using froth flotation. This period of the Elizabeth's history is well-described, with some of the mining and milling technology explained and illustrated. The acid mine drainage emanating from the large tailings pile since the mine's closure in 1958 necessitated the cleanup a generation later to improve local water quality.

The final portion of the book covers the steps of the lengthy EPA cleanup process, highlighting archeological investigation and preservation efforts. Readers will find this documentation quite interesting, as archeological investigations of historic copperas factories are rare. This section includes some helpful maps of the underground mine in relation to the surface and to the mine plant at the site, as well as ore movement and processing diagrams meant to illustrate technical details for the lay reader.

From Copperas to Cleanup includes numerous illustrations, from woodcuts to portraits. The reader will encounter both black-and-white and color period photographs, maps, and diagrams, as well as recent photos of the cleanup and archeological investigations while site work progressed. Several brief sidebar segments explain technological or historical details to educate the general public in topics more experienced mining historians may take for granted or need refreshing about anyway.

A popular report prepared under National Historic Preservation Act requirements certainly has its limitations. This one was not just prepared by some consultant with a contract, a budget, and a time limit, but by one knowledgeable of the history for a start, forced to pare two centuries of material down to its most important and interesting aspects. Well-conceived and written, *From Copperas to Cleanup* may just serve to whet the appetite of mining historians for more such work regarding mine site cleanups, as well as inform the general public of the overall history of a significant reclaimed copper mining site.

Johnny Johnsson
Finksburg, Maryland

Kent A. Curtis. ***Gambling on Ore: The Nature of Metal Mining in the United States, 1860-1910.*** Boulder: University Press of Colorado, 2013; 288 pp., 22 b&w photos, 3 line drawings, 4 maps, notes, bib., ind., cloth, $40. ISBN: 9781607322344

In *Gambling on Ore*, Kent Curtis makes the compelling claim that the "nature" of the culture of producing gold, silver, and copper in the American West forged a national "mining society." To support this assertion, he revisits the well-worn narrative of Montana mining history. He argues that the placer industry initially formulated a "gold mining system" in the 1860s that became a template for dealing with as well as expanding the "uncertainties" of finding the precious metal. This "system" led to the establishment of mining districts that further exacerbated those uncertainties, and instigated rushes that drew tens of thousands of gold seekers, creating even more uncertainties in the emerging political economy.

This gold-mining standard based on taking risks pervaded the silver and copper eras of the 1870s to 1900s period. It empowered the industry to influence national mining laws, to give the appearance of legitimacy by evoking mining engineering as a science to mask monopolistic business practices, and to create markets for its products, especially copper.

According to *Gambling on Ore*, one "nature" of the copper industry was its efforts to create an