

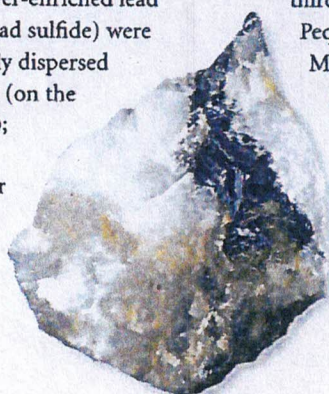


# Pennsylvania's PEQUEA SILVER MINES

## Lancaster County's Hub of Geological History and Modern Recreation

STORY BY JORDAN D. MARCHÉ II

**R**oughly a century and a half ago, Lancaster County, Pennsylvania operated some of the most important metal-producing mines in the eastern U.S. Ore deposits containing nickel, chromium, and silver-enriched lead (argentiferous galena or lead sulfide) were extracted from three widely dispersed sites: the Gap Nickel Mine (on the eastern side of the county); Wood's Chrome Mine (along the southern border of the county and state); and the Pequea Silver Mines (located about seven miles south of downtown Lancaster), respectively. Documentary evidence supports the occurrence of mining activity at Pequea by at least 1709, making it perhaps the nation's oldest mining site that dates from Colonial times. But early colonists had learned of the presence of lead ore from Native Americans, who might have worked the site during the previous century.




Argentiferous galena in quartz from Pequea Silver Mine. Marché specimen  
ex. Kerry Matt. JORDAN D. MARCHÉ II

Today, however, little remains in place at these formerly extensive mining sites. While rather detailed histories have been published concerning the first two mines mentioned above, the same cannot be said regarding the third. Nonetheless, the former site of the Pequea (pronounced "peck-way") Silver Mines was turned into a public (i.e., township) park in the late 20th century. Also, a self-guided, geological walking tour was established that enables visitors to view the mines' principal entrance portal and also study the surrounding geology. The public can discover for themselves what dramatic changes this landscape experienced in the distant past.

The silver-bearing lead deposits were concentrated along the upper folds or hinge lines of a pair of plunging anticlines whose cores were gradually exposed by later erosion. Even more dramatic, however, is recognition of the overlying thrust sheet (a portion of the so-called Martic

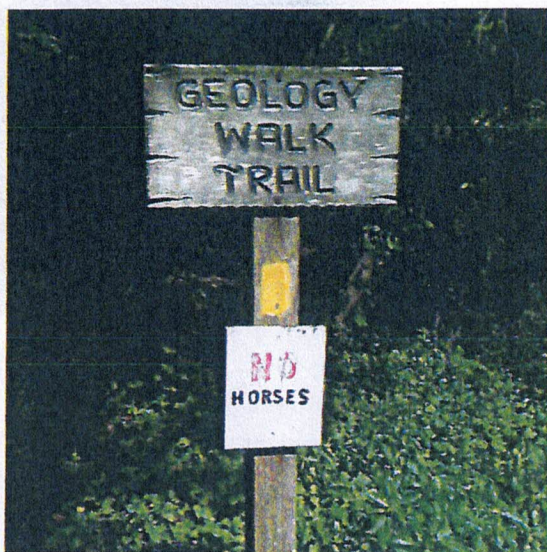




While only a few openings to the mine remain visible, there are a couple, such as this one, which is open to the public and is clearly marked by yellow indicators as part of the Pequea Silver Mine's self-guided geology tour. ADAM ZURN, UNCHARTEREDLANCASTER.COM



## PENNSYLVANIA'S PEQUEA SILVER MINES



Orientation sign for starting self-guided tour of mine workings, exposed geology. JORDAN D. MARCHE II

Thrust) that was emplaced during the late Paleozoic assemblage of the supercontinent Pangea.

Repeated collisions of mini-continents and, ultimately, Africa itself, with the eastern portion of North America, drove these rock masses into their present configurations, causing the buckling of these rock units into the observed anticlines. Perhaps no other geological location offers so much evidence of the region's complex geohistory, all while displayed on such a small scale. Even if no ore deposits, or subsequent mining activities, had ever occurred at Pequea, the exposed geology alone offers sufficient reason to visit this remarkable site.

The Pequea Silver Mines are located about one-and-one-half miles east of Conestoga, and roughly the same distance north-north-east of Marticville, in Pequea Township. Three separate mines were operated at various times, though only the principal mine is described herein. It is situated on the north side of Silver Mine Road, just west of a small creek known as Silver Mine Run, emptying to the south into the larger Pequea Creek. In 1998, some 67 wooded acres containing the mines were acquired by the township and opened for public visitation as Silver Mine Park. A few years earlier, a larger tract of land, some 84 acres in extent (on the south side of the road), was also acquired and repurposed, chiefly for outdoor recreation.

The north unit at Silver Mine Park likewise contains a large, two-story lime kiln constructed for the burning of limestone to make quicklime (calcium oxide). Previously, two kilns stood at the site, but only the one remains. Quicklime was formerly employed in multiple

ways, as a disinfectant, a source of fertilizer, for the making of mortar, and as a whitening agent for paints. Ironically, as the largest standing structure in Silver Mine Park, the lime kiln, which dates from the late 19th or early 20th century, seemingly had nothing to do with extraction or processing of the mine's lead ores. Mineral collecting at Silver Mine Park is prohibited by law and almost certain to be unproductive, anyway.

### EARLY HISTORY

In 1709, William Penn, founder and proprietor of the colony that bears his name, learned that area settlers had begun to take advantage of the Conestoga-area Indians by forcing them into service in the mines. This was done under the pretense that the province's former vice-governor, John Evans (b. ca. 1678), had permitted them to do so. On March 9, 1709, Penn wrote from Reading, England to his colonial secretary, James Logan, to clarify the situation. Penn's advisors had "assure[d] me he and company may, and they believe do, make £100, if not twice told, weekly." He also reported that "the Indians chiefly discovered the mine and worked it on the spot," while it was the chief of the Shawnee Indians and some of his subjects who had "perform[ed] this business" for Evans. Penn asked for Logan's assistance in this matter because as proprietor, it was Penn, and not Evans, who was entitled to royalties from the mine. Logan replied, however, that the rumor was apparently false. Evans denied ever having made such amounts of money from the mine. Logan concluded of the story, "I believe [it] to be a very fiction."

It nonetheless appears that tribes of Native Americans had begun to remove and process lead from the original mine during still earlier times. Archaeological evidence in support of this assertion first surfaced during the 1920s. A local collector of Indian artifacts, a Mr. D. H. Landis of Lancaster, owned a small assortment of lead pipes and a molded bullet removed from Native graves in the vicinity of Washington Boro, a small community on the Susquehanna River about eight miles west of the mines. Landis allowed the bullet to be chemically analyzed by professor Herbert H. Beck of Franklin & Marshall College in Lancaster. Beck found that the sample contained the equivalent of 250 ounces of silver per ton of lead ore, the same percentage derived from a sample of galena acquired in the mine.

Only anecdotal evidence is known about the history of the Pequea Silver Mines throughout the rest of the 18th and early 19th centuries. But in a seeming repeat of the situation that involved former vice-governor Evans, it has been reported that prisoners of the





The original main entrance to the Pequea Siber Mine is still visible



## PENNSYLVANIA'S PEQUEA SILVER MINES

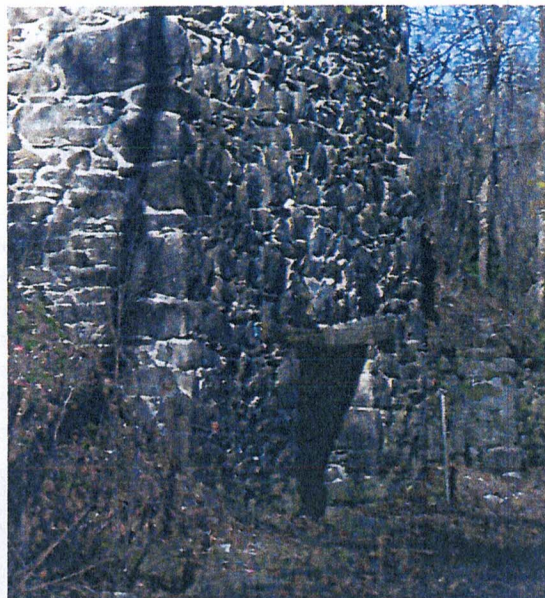
colonists, taken during the French and Indian War (ca. 1750-51), were likewise "forced to work the mines." These sporadic and short-lived efforts have left no known records behind, making a more detailed history of this period impossible to reconstruct. Oddly, the Pequea silver mines were never mentioned in reports of either the First (1836-) or Second (1874-) Pennsylvania Geological Surveys. Such small-scale mining ventures were conducted without a deeper understanding of ore deposits' geology or the use of 'modern' mining and engineering techniques. But that condition was about to change with the coming of the American Civil War.

### NINETEENTH CENTURY DEVELOPMENTS

In 1863, a stock prospectus was issued by the Lancaster Lead Company, founded by New Yorker John C. Mallory, whose goal was to raise \$250,000 to undertake major mining operations at Pequea. The timing of this venture, which coincided with the peak of wartime hostilities, was almost certainly related to the quest for lead ore to be used in artillery production. Whether or not the full amount was raised cannot be answered, but enough funding was secured to hire the services of a Mr. F. P. Herington, an "experienced and highly skillful mining engineer." Herington completed a thorough study of the outcrops to determine the best plan for extracting additional ore. He is presumably the first person who understood the complex structural relationships affecting the rock units. This knowledge proved crucial towards his development of the mine's first horizontal entrance shaft or adit. But first, it will be helpful to explain in more detail the formation of the two principal rock units (lower and upper), and the propensity of the ore to be concentrated along the hinge lines of the two anticlines.

The lower of the two rock units exposed at Silver Mine Park is the Cambrian-age Vintage Formation, which consists of lighter-colored dolomites penetrated by quartz veins—the host rock of the silver-bearing galena deposits. The upper unit is the Cambrian- to Ordovician-age Conestoga Formation consisting of darker phyllites, which are metamorphosed and deformed shales. Both units were originally laid down horizontally on the bottom of the ocean in early Paleozoic time. But subsequent tectonic activities during three successive orogenies dramatically altered and repositioned the units, enabling the silver-bearing lead ore to be preferentially deposited at a later time.

During the series of continental collisions that brought Africa up against the eastern margin of North America, two major types of changes occurred to the lower and upper rock units. Both the Vintage and



Old lime kiln used for making of quicklime (calcium oxide), late 19th to early 20th centuries. JORDAN D. MARCHE II

Conestoga formations were primarily deformed by compression, which produced a series of 'wrinkles' in the form of anticlines and synclines. But likely during the final push from Africa, a portion of the lower unit, together with a portion of the upper unit, was sheared apart along a bedding-parallel thrust fault. The entire block was pushed horizontally on top of and across the remaining lower unit. The event was known as the Martic Thrust. As a result, one can see a vertical duplication and horizontal deformation of these two rock units along the exposed wall of the park. Horizontal deformation produced the pair of plunging anticlines, along whose hinge lines the sulfide ores were later deposited.

The reason for their concentration was that the overlying phyllites were impermeable and thus prevented further upward migration along cracks of the hydrothermal fluids, which bore the sulfide ores. It should be noted that all of those tectonic events took place several miles below Earth's surface when the final mountain-building stages accompanying Pangea's assemblage occurred near the end of Permian time. A substantial alpine mountain range was the result, which was subsequently worn down by erosion to expose only the former roots of those once-lofty mountains.

Although the timing of the ore's emplacement is not known with certainty, the probable source of its hydrothermal fluids is better understood. About two-and-one-half miles to the west is a large diabase dike exposed at Safe Harbor that dates to late Triassic or early Jurassic time. It may have been during the



## PENNSYLVANIA'S PEQUEA SILVER MINES

subsequent breakup of Pangea, and the opening of the present-day Atlantic Ocean, that hydrothermal fluids brought the sulfide ores into their positions in the deformed rocks of Silver Mine Park.

While these world-altering tectonic events remained completely unknown to 19th-century geologists, their understanding of ore deposits made significant strides. Mining engineer Herington elected to create a horizontal adit (kept above the water table throughout), which first traversed a still-lower, isolated unit of phyllite, then through the lower Vintage dolomite up to its next contact with the overlying Conestoga phyllite. At this contact zone, ore was presumably encountered and collected, creating the first of three 'rooms.' The adit was extended a short distance forward, where it traversed the thinner, upper dolomite unit and then encountered the uppermost phyllite unit. Here again, ore was encountered at the contact zone and a second 'room' resulted from that excavation. Next, the adit was turned left (southward) and worked along this contact zone.

Another larger ore pocket was seemingly encountered, as its removal created a third big 'room.' Finally, the adit was again turned right (westward) to follow another minor repetition of the strata. Still, no further ore was located and the project seemingly reached its end. Cessation of wartime hostilities may have coincided roughly with the end of mining activity. No further need for lead was apparently called for in the aftermath of that conflict.

It is unclear how many miners were engaged in this effort, but evidently, Herington did not perform the work alone. A former miner later reported that a Captain Joseph Buzzo (of the Union forces?) played a major role in the excavation and that a considerable amount of silver resulted from the effort. While no further records of that Civil War-era mining venture have been located, the engineer's strategy was evidently successful. As present-day structural geologist Donald U. Wise phrased it in his account of the mine workings, "One cannot fail to be impressed by the intelligence with which the mining engineer followed the ore pockets through this complex geology. Even today, . . . I could not have designed a better exploration plan."

Roughly a decade elapsed before additional mining was conducted at the site. This time, however, it appears that silver was the primary objective. Between 1874 and 1875, the property was acquired by Harvy Filly, a silversmith from Philadelphia. Filly and a group of three investors backed the venture. An Englishman named Thomas Hollow became the mine superintendent, while Abraham Bechtol,

formerly superintendent of the Baker Mining Company of Colorado, was hired as a mineralogist. At least six miners, all of whom walked three miles each way to and from the mines, resided in nearby Willow Street.

The actual work performed underground may be conjectured from the presence of two additional shafts, each of which extends downwards at a significant angle from the adit formerly cut by Herington and Buzzo. Both of these shafts deliberately followed the sloping contacts (to the north) between the Vintage and Conestoga formations. One shaft extended roughly 120 feet from the first room of the adit and explored the lower contact zone, while a second shaft extended some 140 feet from the adit's second room, thereby exploring the upper contact



Entrance to mine adit created during Civil War years. JORDAN D. MARCHE II

zone. However, no records are known of the quantities of ore removed, nor of the silver smelted from the lead. However, this second phase brought a fairly rapid end to the process because the water table was soon encountered. Subsequently, those two angled shafts were flooded, which after that prevented further significant mining from taking place along those same contacts.

Two other largely futile efforts were made to recommence ore mining at Pequea; each occurred about a generation apart. The first of these took place around 1900 when two brothers from Conestoga sporadically worked the mines. The second and final effort occurred in 1930 — when a Lancaster man leased the mines from the property owner, Joseph Miller. This latter activity also appears to have been associated with extraction and burning of the local limestone — and might have led to the construction of the newer, extant lime kiln, which still stands today.



# PENNSYLVANIA'S PEQUEA SILVER MINES

## SPECIMEN MINING IN THE MID-TO-LATE 20TH CENTURY

A new but seemingly short-lived phase brought the Pequea Silver Mines back into a functioning status once again. During the 1970s, a Lancaster company named Silver Ford, Inc. acquired the property and reopened the mines to rockhounds, although the duration of this arrangement is unclear. Electric lighting was installed along the main adit, while pumps constantly worked to drain water from the two deeper shafts. The mine's caretaker was Jim Monaghan, who reportedly was eager to show collectors the best sites to explore. Monaghan was very knowledgeable of the mines' prior workings and readily shared aspects of their history with visitors. Hardhats with carbide lamps were seemingly provided as well. For a modest fee of \$3, adults could try their luck.

## INFORMATIVE RECREATION

After Pequea Township acquired Silver Mine Park, a self-guided walking trail was conceived and created by Conestoga Eagle Scout Paul Helwig, who cooperated with geologists Donald Wise and Alan Peterson of Lancaster. Eight stops were chosen to highlight the mine's historic structures, including the lime kiln and entrance to the adit (now closed by an iron gate) and the area's remarkable geology. A ninth stop showing a submarine landslide deposit may be seen about 200 yards down the road to the east.

Visitors should be aware that, after parking upon arrival, they should proceed to the north end of the lot to begin the geological walking tour. From there, follow the rock face back towards the park's entrance. Stops 2 through 8 of the tour are chosen to demonstrate the rapid alternation of the strata's dip as one progresses from north to south across the two anticlines' faces: the respective dip directions are right, left, right, and left. Due to the influx of soil and overgrowth of vegetation, however, it may not always be easy to make out these rapid changes.

Unfortunately, no ore samples from the Pequea Silver Mines are on display at the park. But specimens from this, and the other two mines mentioned earlier in the article, may be viewed at the North Museum of Nature and Science, 400 College Avenue, Lancaster, PA 17603. Visit <https://northmuseum.org> or call 717-358-3941 for information.

*Thanks are due to Kim Ulaky, Pequea Township municipal secretary, for photos of the park's lime kiln and adit entrance, and to Nathan Pease, director of library services, LancasterHistory.org, for furnishing copies of articles from the Journal of the Lancaster County Historical Society.*



Silver Mine Run: creek beside the mine's entrance. JORDAN D. MARCHE II

## GETTING THERE

From Lancaster, first proceed southward on South Prince Street (U.S. Route 222) to the turnoff (toward the right) onto PA Route 324 (New Danville Pike, a.k.a. Main Street) towards Conestoga. At the five-way intersection with West Penn Grant Road and Silver Mine Road, turn (gently) left onto the latter. Proceed south to the intersection with Goods Road but simply make a gentle left, remaining on Silver Mine Road. Entrance to Silver Mine Park is about a quarter-mile ahead, on the left, just before reaching Silver Mine Run.

**Address:** 200 Silver Mine Road, Conestoga, PA 17510.

**Website:** <http://www.pequeatwp.org/park-info/>

**GPS coordinates:** 39° 56' 40.3" north, 76° 18' 46.8" west

It is recommended that visitors download the "Geology and Self-Guided Tour Info" from the website, before arriving at the park, in case print copies of the same are temporarily unavailable. One may also download the "Walking Trail Map" that displays trails through northern and southern units of the park. 📶

## REFERENCES

- Eckman, D. J. "Early Silver Mining in Lancaster County and Location of Mines." *Journal of the Lancaster County Historical Society* 31, no. 2 (1927): 21-24.
- Foose, Richard M. "Geological Notes on the Pequea Silver Mine, Lancaster County, Pennsylvania." *Proceedings of the Pennsylvania Academy of Science* 21 (1947): 58-63.
- Kanter, M. Kathleen. "Collecting at the Oldest U.S. Silver Mines." *Rockhound* 5, no. 2 (March-April 1976): 4-6.
- Kinsey, W. Fred, III, ed. *The North Museum and the Natural History Tradition of Lancaster County*. Ephrata, PA: Science Press, 1986.
- Locher, Jack. "A History of Mining in Lancaster County: 1700-1900." *Journal of the Lancaster County Historical Society* 64, no. 1 (1960): 1-16.
- Loose, John W. W. "Lead and Zinc Industry in Lancaster County." *Journal of the Lancaster County Historical Society* 76, no. 1 (1972): 30-40.
- Price, John W. "A Brief History of the Pequea Silver Mine, Lancaster County, Pennsylvania." *Proceedings of the Pennsylvania Academy of Science* 21 (1947): 53-57.
- Wise, Donald U. "The Pequea Silver Mine of Lancaster County, Pennsylvania." *Pennsylvania Geology* 36, no. 1 (Spring 2006): 2-13.

