Maryland's Choate Chromite Mine, 1830-1920

By
Johnny Johnsson

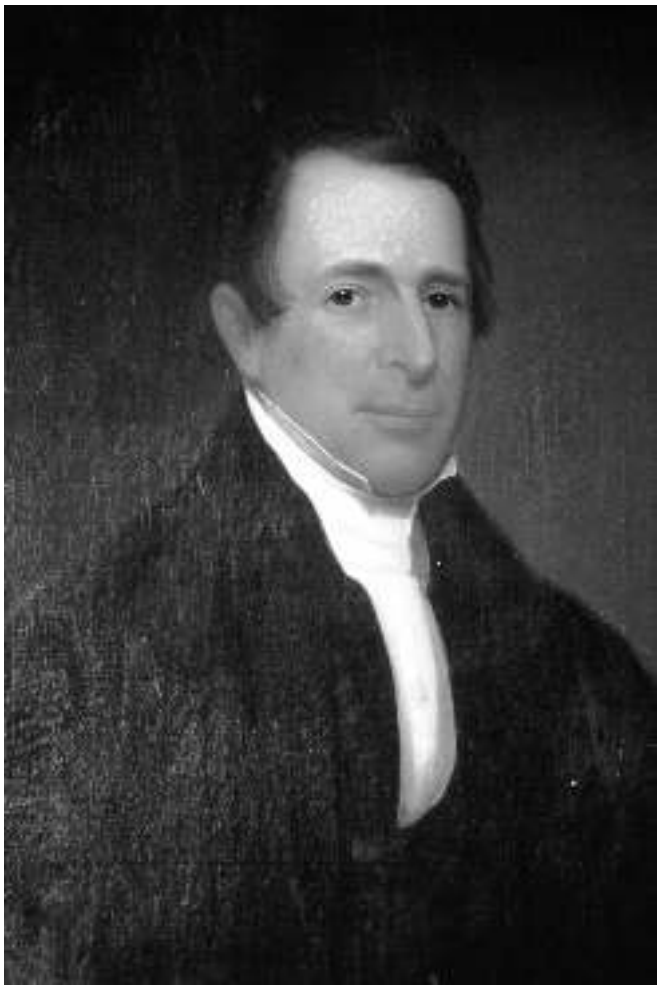
Chromium was mined in Maryland during parts of the nineteenth century, and some of the mines were reworked in the early years of the twentieth century. The Choate Mine in Soldiers Delight, Baltimore County, an important producer of chrome ore, was typical of these underground metal mining operations owned or operated by the renowned Tyson mining family of Baltimore during the mid-1800s.

The preservation of several rare manuscripts of Isaac Tyson, Jr., yields small glimpses of the early development of this mine. As founder of the American chromium industry, Tyson was inducted into the National Mining Hall of Fame and Museum in 1996.[1] His "Record Book of Deeds, Leases, etc., 1828-1849" resides in the Maryland Historical Society Library in Baltimore. The "Old Memo and Journal" that he kept in 1833 and 1834 is archived at the Vermont Historical Society in Montpelier. His "Memorandum Book, 1835-1852" is kept in the private Tyson family archives.

These primary sources, together with land records, published accounts, rare photographs, and several pieces of heretofore unknown correspondence, make possible a history of the Choate operation; one that illustrates how minerals were discovered, acquired, and mined to supply needed raw materials during the Industrial Revolution.

Early Chromium History and Soldiers Delight

The Choate Mine is probably the most accessible and best preserved underground metal mine in Maryland. It is located in the serpentine barrens of the Soldiers Delight Natural Environment Area near Owings Mills in Baltimore County. The absence of thick topsoil and vegetation



Isaac Tyson, Jr. (1792-1861), Quaker industrialist from Baltimore, Maryland, founded the chromium industry in the United States. (Author's photograph, 29 July 1999. Courtesy of William Whitman.)

and the fact that the mine was operated as recently as World War I account for its good condition. One can still observe mine timbers and building foundations at this site, which is just a short walk on a marked trail from the overlook and historic sign on Deer Park Road. As a volunteer ranger, the author conducts fall and spring mining history hikes for the Maryland Park Service highlighting the legacy of the Choate Mine. The history of this chrome mine covers nearly a century. It was bought, worked, and resold several times during its life, a typical phenomenon for mining operations.

Chromite, or chromate of iron ($FeCr_2O_4$), was first discovered and mined in the United States in 1808 or 1810 at Bare Hills, just north of Baltimore. The chromium-bearing mineral provided the key ingredient necessary to manufacture the colorful chrome-yellow paint pigment prized by English royalty and useful in the arts. Isaac Tyson, Jr., a devout Quaker and son of a wealthy flour merchant, exported chromite to Europe from Fells Point, Baltimore, on Baltimore clipper ships. By 1822 the mineral was also known to occur in alluvial sand and as heavy, black rocks on the surface in nearby Soldiers Delight, a large grassland area with underlying serpentine similar to Bare Hills.[2] Subsequent important discoveries were made in Harford and Cecil counties and in southeastern Pennsylvania.

Loose rocks of the dark, weather-resistant chromite on the grassy surface gave evidence of lenses of ore underground. Grains of disseminated chromite also weathered from the serpentinite and formed placer deposits of sand chrome in nearby stream valleys. Tyson, who got his start in mining chromite at Bare Hills, began leasing mineral rights and purchasing property in Soldiers Delight in 1825. His first purchase was 15 acres of "Graziers Delight" and 91.25 acres of "Gosnell's Camp Resurveyed" and "Wilmot's Chance." He bought this land in October 1825 from John Boughman for the sum of one thousand dollars.[3]

Establishment of the Choate Mine

Tyson became acquainted with the Choate and Triplett families of Soldiers Delight and worked with them to secure supplies of sand chrome and lump ore that he marketed and exported or used in early experiments in manufacturing chromium chemicals in addition to paint pigments. Several parcels of land in Soldiers Delight were owned by Solomon Choate's family. Solomon's cousin,

The sloping entrance to the Choate Mine.
(Author's photograph, 28 September 2013.)

The author demonstrating historic mine lighting artifacts at the entrance of the Choate Mine during an October 2013 mining history hike.

The gravestone of Herod Choate (1796-1877) in Reisterstown Cemetery. (Author's photograph, February 1999.)

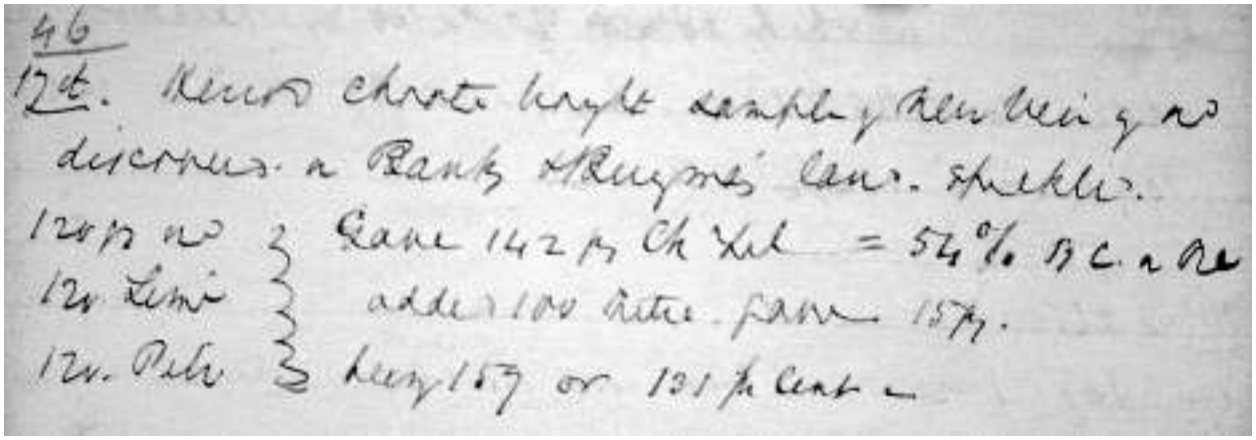
Herod Choate, a veteran of the defense of Baltimore in 1814 who had recently returned with his family from a sojourn in Kentucky, worked chromite deposits located in Soldiers Delight.[4]

The Choate Mine may have originated during this early time period. At least it was an important supplier of chromite to Tyson. Considering the size and richness of its chromite lens, it is possible that the Choate Mine was the place of first discovery of lump chrome ore at Soldiers Delight.

In 1830 John Berryman, who was married to Herod Choate's sister Deborah, and Daniel B. Banks, a prominent Baltimore City merchant and landowner, purchased as tenants in common the large tract of land called Graziers Delight, where the Choate Mine is located.[5] It is interesting to note that this deed, by sale of trustee, does not mention mining or mineral rights, making it possible that the trustee was unaware of the extraction of valuable chromite deposits by residents of Soldiers Delight. On the other hand, the purchasing parties and the selling trustee may have been well aware of the mineral potential of the property and considered it in their dealings, because the author's land records research indicates that mineral rights are not always specifically addressed in early fee simple property transfers.

In March 1834 Isaac Tyson rented a horse from a livery stable in Baltimore and rode out nearly twenty miles to Soldiers Delight for two days to visit the chromite operations. By this time, Edward Triplett was apparently an agent for Tyson, a relationship their families would continue through successive generations. Tyson travelled around Soldiers Delight with Triplett inspecting the washing of placer chromite from the streams and negotiating business deals. He contracted with Herod Choate for chromite ore for twenty-two dollars per ton. After a long ride home in the rain, Tyson recorded that he "reached home at 7 o'c [*sic*] facing the wet nurse very poorly."[6] In other words, he was drenched and probably looked like a drowned rat, with the wet nurse reference pertaining to their family situation concerning the recent birth of his son Isaac Tyson, III. In 1839 another contract secured chromite for the price of twenty-five dollars per long ton, with Tyson supplying the barrels and making a reasonable allowance for moisture content.[7]

In October 1843 Herod Choate gave Tyson a sample of speckled ore from a newly discovered vein on Banks' and Berryman's land. Tyson carefully separated chromite from the gangue. His laboratory analysis using lime and saltpeter showed that this ore was capable of yielding 54 percent potassium bichromate, the chromium chemical



Assay No. 46, an 1843 Tyson laboratory analysis of speckled chrome ore from the Tyson Memorandum Book. (Courtesy of the Tyson family archives, South Strafford, Vermont.)

he was attempting to manufacture.[8] This location may have been one of the unnamed mines or prospects near the Choate Mine. In 1845 Tyson successfully patented a process for manufacturing chromate of potash. This process claimed an improved yield using supplemental wood ashes versus ordinary potassium carbonate or other alkaline salts.[9] He established a chromium chemicals factory, Isaac Tyson and Company, in partnership with his son Jesse, in Fells Point, near his export wharf.

Operation of the Choate Mine diminished during the 1850s and early 1860s. At that time the large Wood Pit Mine in Lancaster County, Pennsylvania, supplied most of Tyson's high-grade ore. Tyson contracted to buy John Berryman's interest in the Choate Mine property for $4,162.50. Berryman died and Tyson was forced to file a bill of complaint in the Circuit Court of Baltimore City against Berryman's heirs to complete the purchase. In 1860 he succeeded in acquiring John Berryman's undivided half-interest in the five hundred acres of land in Soldiers Delight for the contracted price, but in 1861 Tyson died.[10]

Post-Civil War Mining

Coincident with the Civil War began a new period of significant operation of the Choate Mine. Isaac's eldest son Jesse Tyson had inherited control of the chromium chemicals business, whereas his son James Wood Tyson oversaw the chromite and copper mining operations. Isaac's vast land holdings and mineral rights for chromite, including much of Soldiers Delight, were consolidated as part of the Tyson Mining Company in 1867.[11] The Baltimore Chrome Works was also incorporated to continue manufacturing chromium chemicals. Each brother served as an officer and director of the other's primary business, with the Baltimore Chrome Works initially purchasing chrome ore from the Tyson Mining Company. The remaining stock ownership of these closely held companies was divided among Isaac Tyson's non-managing family members in a trust arrangement.

The Choate Mine and other productive mines in Soldiers Delight, including the Ware, Harris, and Calhoun, operated until approximately 1880.[12] After the Civil War, four-hundred-pound wooden barrels packed with chromite from Soldiers Delight lined the Owings Mills railroad-station platform, awaiting shipment. Empty barrels for chrome ore could also be found staged along the Reisterstown Turnpike. Local residents used to bet strangers successfully that they could not up-end these heavy barrels, which required a reinforced wagon to transport.[13]

Reportedly, due to a disagreement between a business partner and the Tysons, the Choate Mine was closed while continuing to produce high-grade ore.[13] The business partner may have been Daniel Banks' son Andrew, who inherited the other half-interest upon his father's death in 1875.[15]

Most likely, economic considerations played a major role in the mine's closing. By 1880 the Baltimore Chrome Works purchased plentiful chromite from Tyson Mining Company sources in California. These California ores made the long voyage around Cape Horn until they too were supplanted by chromite from Turkey. In addition, the Tyson Mining Company advanced and lost money in speculative copper ventures such as the nearby Mineral Hill Mine and the Elizabeth Mine in South Strafford, Vermont.[16] The ore grade and the costs of extracting chromite from the Choate Mine were not favorable enough to overcome all of these factors.

Underground mining during the 1800s was labor intensive. Hand-drilling and black powder were used to blast inside the mines. Miners employed picks and sledge hammers to break ore and waste rock, and their hands or shovels to load and remove it. Working areas were foul from the smoke generated by the oil lamps or candles that provided dim lighting. Natural ventilation was provided by sinking an air-shaft to provide each mine with at least two openings; nevertheless, the air was often damp and stale from poor circulation, blasting, and dust. Primarily Irish immigrants, as well as German and Polish, boarded in houses around Soldiers Delight and worked in the mines. Some of these miners worshipped in

1877 C. M. Hopkins Atlas Map of the Second District of Baltimore County, Maryland, showing the area of the Soldiers Delight serpentine barrens where Tyson's chrome mines, such as the Choate Mine, were located.

the nearby Methodist Wards Chapel.

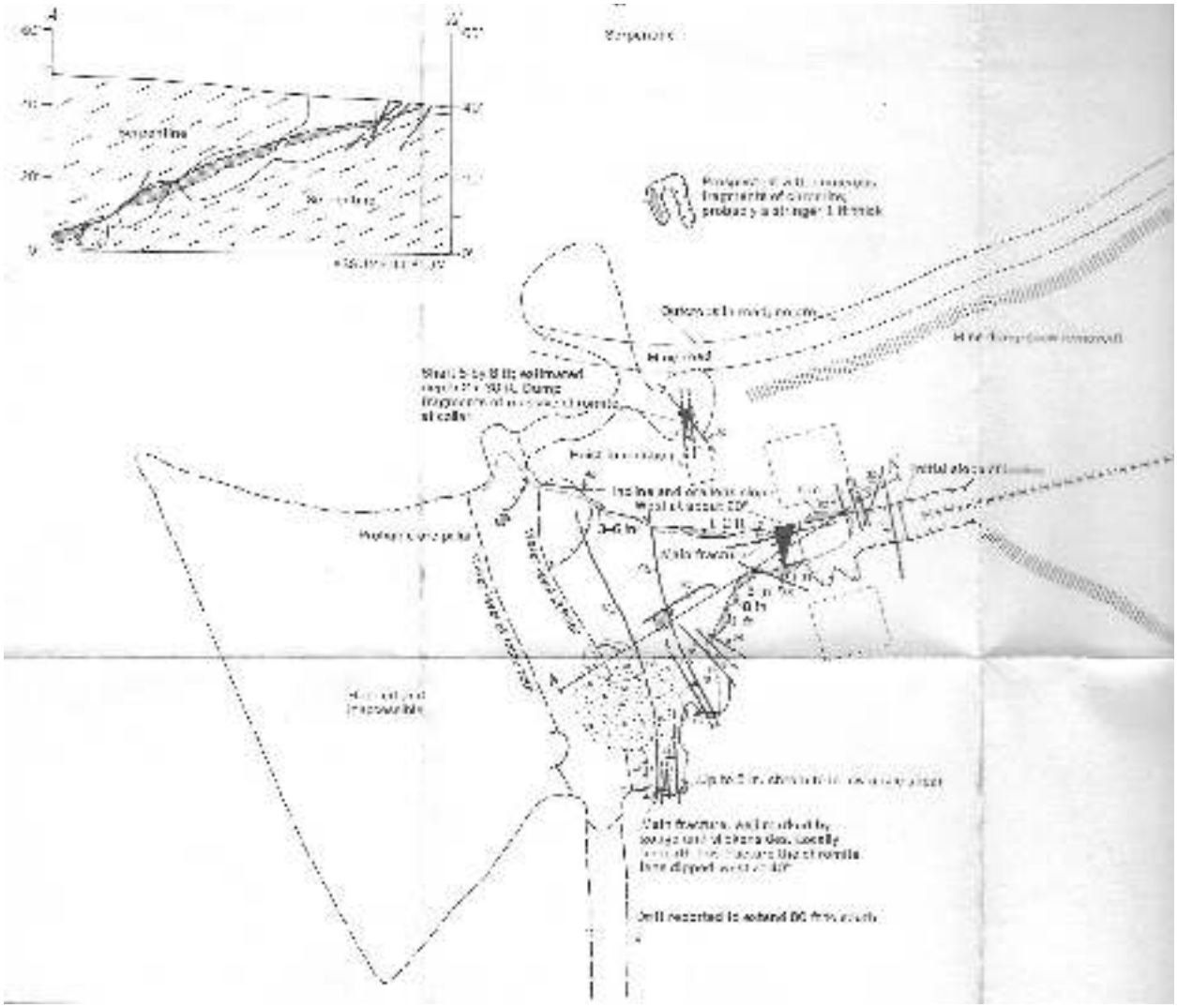
In the Choate Mine, timbers and pillars of rock provided support for the roof of the wide mine workings. Waste rock from active ore mining areas, or stopes, became backfill for old workings. Ore and waste rock were sorted by hand and placed into ore carts, wheelbarrows or buckets for removal to the surface. Horses or mules were employed to bring ore cars out of the mine on rails and up the slope from the entrance. A steam engine may have provided power at some point for hoisting or pumping, although the mine—now mostly flooded by surface storm water—contained tight bedrock and thus remained relatively dry and required limited pumping.

The Choate Mine is 165 to 200 feet deep on a 20-degree slope, dipping south 75 degrees west, and it fans out to approximately 160 feet inside.[17] The workings are also connected to the surface by a thirty-foot vertical, five- by ten-foot shaft located just west of the slope entrance. A forty-foot drift runs north inside the mine and an eighty-foot drift south, where lenses of chromite were mined.[18] The chromite lenses at the mine varied in thickness up to maybe four or five feet, but due to pinching and swelling averaging only two feet. On the basis of known workings, dumps, and descriptions, it has been estimated that the mine produced at least three thousand tons of chromite before 1900.[19]

World War I Operations

After lying dormant for several decades, the Choate Mine was revived during the closing years of World War I. Following the death of James W. Tyson in 1900, various family member-investors in the Tyson Mining Company determined that

A view inside the mine showing timber props from World War I, a pack wall to the left, and a pillar with chrome ore. (Author's photograph, 30 August 1997.)

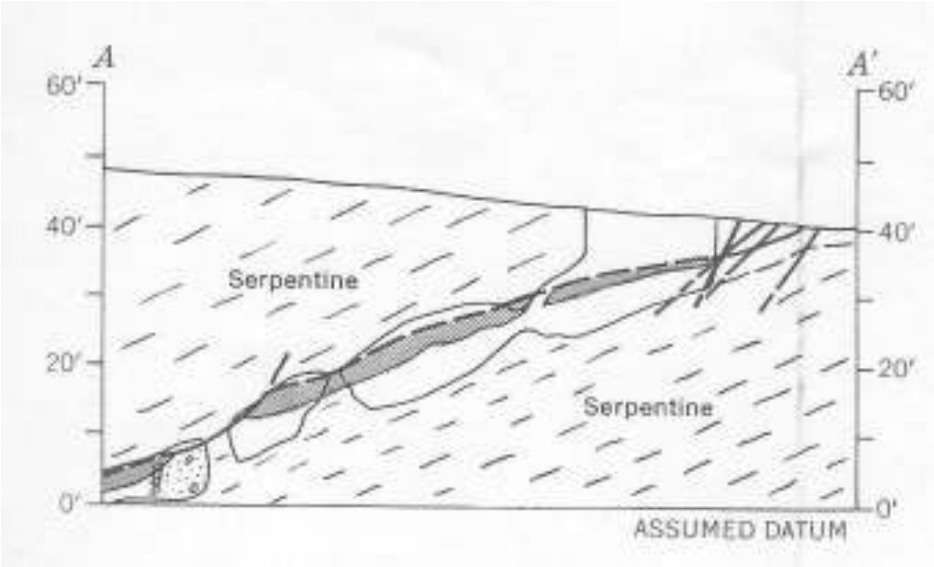


A plan view of the Choate Mine, USGS Bulletin 1082-K, Plate 43.

the company was insolvent. The chrome mining concern owed $235,734 to the Baltimore Chrome Works and went into receivership in 1903.[20]

Watson E. Sherwood, a Baltimore attorney, purchased the remaining Tyson Mining Company interest in over six hundred acres in Soldiers Delight in 1906.[21] Frederick A. Dolfield, a banker who worked at the Colonial Trust Company, which handled Jesse Tyson's estate for his widow, also bought parcels in Soldiers Delight adjacent to his farm. In 1916 Dolfield and Sherwood purchased the remaining undivided half-interest, once owned by Daniel Banks, in the large tract containing the Choate Mine.[22]

In 1917 J. S. Diller of the United States Geological Survey advised Dolfield and Sherwood of the potential shortage of chrome because of the war.[23] Steel plants needed chrome ore for refractory use, and armaments called for strong chromium steels. German U-boats threatened normal import shipments from dominant chromite suppliers South Africa and Asia Minor. These factors caused chromite prices to rise above forty dollars per ton. Dolfield then consolidated lands and mineral rights for mining by purchasing Sherwood's interests.[24]



A section view of the Choate Mine, USGS Bulletin 1082-K, Plate 43.

Dolfield brought in John H. Buxton, Jr., a mining engineer who dabbled in gold mines and other ventures, to reopen the Choate Mine. In exchange for installing some of his used gold mining machinery and equipment from the Great Falls, Maryland, area, Buxton became a one-third partner in the venture, and was to receive the first twenty thousand dollars cash from shipments of ore. Dolfield and his banker associates were to provide the property and cash for labor and for constructing buildings.[25]

According to Buxton, Jones and Laughlin Steel of Pittsburgh initially granted the chrome-mining concern a contract for one hundred thousand dollars worth of medium-refractory-grade chrome ore. Based on fifty-dollars-per-ton revenue, this represented an order for some two thousand tons of ore. Midvale Steel and Ordnance of Philadelphia then added a similar contract, followed by a five-hundred-thousand-dollar order for top-grade chrome ore from the metallurgical concern of Buffalo and Niagara.[26]

It is unlikely there were enough proven or probable reserves to meet such demands. The mining company clearly would have had to locate ore beyond the Choate Mine to fully supply such contracts. Representatives from the Dorr Company of New York, including engineer Clive Newcomb, visited Soldiers Delight and determined potential recovery of chrome sands from the decomposed top bedrock. In addition, prospecting in one placer area known as "Demmitt's meadow" demonstrated some two thousand tons of sand chromite reserves.[27] With costs for mining in a crude way of just twelve dollars per ton, the profit incentive induced the owners to capitalize on a larger scale and really develop chrome mining on their property.

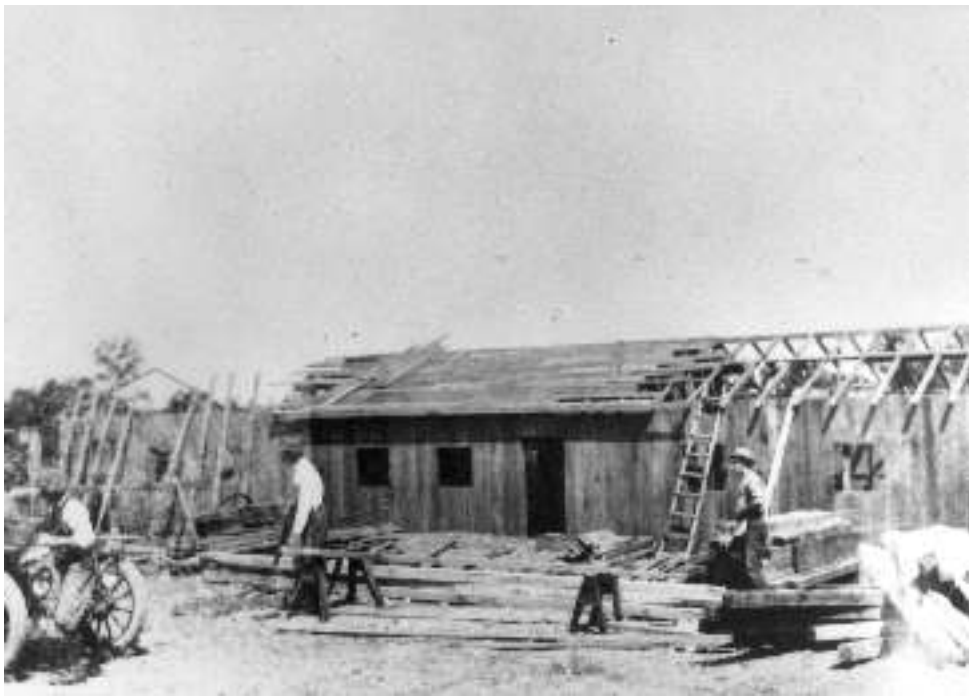
The Maryland Chrome Corporation was established in early 1918 with four directors and appropriate officers. Frederick A. Dolfield served as president and M. Roland Bramble as secretary. These gentlemen were officers in the Canton National Bank. John H. Buxton, Jr., served as general manager and superintended the mine. Director and investor Frank H. Gunther was a member of a Baltimore family known for its Gunther Brewery Company. The chrome concern was capitalized for one hundred thousand dollars, divided into one thousand shares of one hundred dollars par value.[28]

Buxton began preparing the site for mining during the summer of 1917. Assisted by two of the Tysons' old miners, probably members of the Triplett family, he pumped the water out of the mine and constructed buildings to aid in mining

Preparing the Choate Mine for production during World War I; dewatering with a pump in the summer of 1917. (All 1917 vintage photographs were taken by Ralph Ewing "Ted" Buxton, nephew of John Buxton, Jr., and are provided courtesy of Jane Buxton Cameron and Colby Rucker, grandniece and grandnephew of John Buxton, respectively.)

Overview of the Choate Mine entrance area as renovation commenced in the summer of 1917.

Outfitting the Choate Mine for production during World War I. The automobile in the photo is John Buxton's 1911 Stoddard-Dayton. Also note the stacks of lumber, apparent boiler, and nail kegs in the photo.



The Choate Mine building under construction in the fall of 1917.

The Choate Mine building nearing completion, with Buxton's 1911 Stoddard-Dayton automobile, in the fall of 1917.

The completed Choate Mine building in the winter of 1918.

The Choate Mine trestle and water tank in the winter of 1918.

The Choate Mine water tank and stack in the winter of 1918.

Frederick A. Dolfield (1875-1955).
*(*The Book of Maryland: Men and Institutions. *(Baltimore: Maryland Biographical Association, 1920).)*

operations. They also removed thousands of tons of debris and placed new timber posts to support the roof. These timbers can be seen from the entrance today. Frank Parker assisted the engineer by oiling pumps and working on pipes to keep water out of the mine.[29] Buxton's nephew Ted Buxton and members of the Ziegler family aided in the mine renovation. Ted Buxton took the only known period photographs of the Choate Mine using a Kodak Brownie camera, then joined the U.S. Marines in August 1918 as the nation became more directly engaged in the war.[30]

While it was being outfitted, the mine shipped some easily accessible chrome ore to Pittsburgh and Philadelphia. Boilers, hoisting engines, air compressors, drills, and other necessary mining equipment were bought, but then the company waited months for these items to arrive on site, some never arriving. Due to the war, limits on commerce and railroad shipping embargos confounded plans to develop and operate the mine. Vital machinery was essentially stuck on some side track somewhere. Even with electric generators, concentrators, tanks, and a reservoir, the partially equipped mine could not operate other than to mine and ship limited development ore, enough to cover the labor cost of removing it.

To whatever degree the Choate Mine operated for a short time, its chrome ore was handsorted to separate out good lump ore, and the lean ore was ground and concentrated on James tables. Both lump ore and concentrates averaged over 40 percent chromium. Apparently, the mill ran at least a test run with a ratio of three units of rock yielding one unit of concentrates, samples of which were sent to the Baltimore testing laboratory of Penniman and Browne for assay.[31]

Frederick Dolfield reflected: "Just about the time the mine was completed and ready to produce, the war stopped, about a year ahead of what was expected."[32] Buxton noted the irony of the situation, that "on November the 11th—the whistles began to blow—and the excitement was—the war is over. We had a mine. We had a lot of equipment. We had lots of ore. Nobody wanted any of the mine, equipment or the ore."[33] The Jones and Laughlin order for ten thousand tons was cancelled after only $2,500 had been shipped. The mine sold $500 worth of sand chrome to the Hess Steel Company in Baltimore.[34]

Red Dog Lodge

During the redevelopment of the Choate Mine, the Buxton family resided in Red Dog Lodge in Soldiers Delight, built as a hunting cabin by Dolfield and Sherwood in 1912. The stone

The Buxton family with guests on the porch of Red Dog Lodge in the summer or fall of 1917.

lodge featured both a large sunken-hearth fireplace and a wood-burning stove for cooking and heating. The dormered attic served as a loft for sleeping, with a door opening to an outside sleeping porch. A wrought-iron chandelier suspended by heavy chain from the ridge pole, an Aladdin Lamp, and several kerosene lamps with reflectors on the walls provided lighting to the dark interior. Wood found application as floorboards, and in four-foot-high wainscoting, a thick fireplace mantle, and a long table with benches. On the exterior of the lodge a stone porch with a roof provided a beautiful vantage point for numerous sunsets across the barrens. Outbuildings included a small wooden carriage house, a "maternity" house, and a two-holer outhouse.[35]

Buxton's Canadian wife Ruth joined John with their young daughters Carolyn and Margaret, enjoying corn-on-the-cob gatherings in the picnic grove during the fall of 1917, as well as the harvest bounty of local orchards. Ruth wrote to her mother-in-law: "It has been glorious out here today. Tonight it is cool and we have a cheerful fire in the fireplace. I wish you had some of the lovely apples one of the workmen brought today—just imagine—he carried a big market basket of fruit three miles. Tomorrow, Jack [John Buxton] is going over in the machine to get more." "The machine" referred to a 1911 Stoddard-Dayton touring car John Buxton had purchased circa 1916. Manufactured in Dayton, Ohio, it had a reputation for performance and being well-built, and was advertised as "A Practically Noiseless Car." Evidently, his broke down more than it ran, yet he enjoyed giving other folks courtesy rides.[36]

The family spent the harsh Winter of 1917-18 in semi-primitive conditions, but was apparently well-off enough to afford to hire a cook named Veda, who hurt her finger putting wood into the fireplace.[37] Blue "granite-ware" cookware

The Red Dog Lodge corn-on-the-cob picnic, in the summer of 1917. Pictured left to right: Frederick Dolfield, William Stone, unidentified gentleman, Mrs. Stone, Mrs. Dolfield (standing), Ruth Buxton, Carolyn and Margaret Buxton, and John H. Buxton, Jr.

from their stay is on display at the Soldiers Delight Natural Environment Area Visitors' Center, and Red Dog Lodge is maintained by the Maryland Park Service.[38] A son, John H. Buxton, III, was born to the couple in June 1918 in the "maternity" house. The family then moved into a frame bungalow constructed closer to the mine. The Buxtons appear to have remained unscathed by the world-wide influenza pandemic that swept through the country during this time period.

Post-War Efforts

By 1920, the mining equipment had been sold and the assets of the Maryland Chrome Corporation were liquidated. The parties recovered some of their expenses from contracts automatically cancelled by the government. The ownership of the property then reverted back to the three stockholders, Dolfield, Bramble, and Gunther, as tenants in common in undivided shares of nine-, five-, and six-twentieths, respectively.[39]

After World War I, several unsuccessful attempts were made to reopen the Choate Mine. The Tripletts continued working the local chromite placers into the early 1920s, supplying sand chrome for setting colors in fine porcelain ware. The tailings and waste rock from the mine were washed in the nearby Triplett buddle to recover chromite or were used to construct local roads. Several men were reportedly asphyxiated during an attempt in the late 1920s to dewater the mine with gasoline-powered pumps.

The old chrome mines in Soldiers Delight have been investigated periodically by industry, the U.S. Geological Survey, and the U.S. Bureau of Mines. Because chromium has been a strategic mineral for national defense and most world-wide production and reserves exist in politically unstable countries or closed economies, the identification of domestic resources of this scarce commodity has frequently been undertaken. An

John H. Buxton, Jr., with wife Ruth (expecting), and daughters Carolyn and Margaret in a box sled, winter of 1918.

unsuccessful geophysical survey of the Choate Mine was conducted in 1928. Other geophysical surveys to locate chromite in Soldiers Delight were reportedly conducted by the Bureau of Mines and Bethlehem Steel during the 1930s.

Edward K. Judd, a former mining engineering professor at Columbia University turned consultant, conducted a magnetometer survey of Soldiers Delight. He took many readings on a grid pattern around the Choate and other mines.[40] A prolific writer for *Engineering and Mining Journal* and author of chapters in *Peele's Mining Engineering Handbook* and *Taggart's Handbook of Mineral Dressing*, if Judd had successfully located any definitive chromite ore bodies, we probably would have read about it. Geologists found it hard to discover small and scattered podiform alpine peridotite chromite lenses using remote exploration techniques. Comprehensive mapping was conducted by U.S.G.S. geologists in the mid-1950s and more recently the area was included as part of a Bureau of Mines study in 1984.[41]

Modern geophysical techniques have shown some but limited potential for locating chromite orebodies. A very-low-frequency electromagnetic investigation near the Choate Mine indicated a possible ore lens a hundred yards or so down the hiking trail from the mine, but no core drilling was conducted for confirmation.[42] Furthermore, geochemical exploration may be applicable, albeit challenged by the ubiquitous presence of placer chrome sands derived from chromite grains found throughout the serpentinite.

Minerals at the Mine

The Choate Mine piques the interest of mineral collectors periodically. This has been evident in a number of publications over the years, even though for several decades mineral collecting in Soldiers Delight has been prohibited due to its Natural Environment Area "park-like" status. In addition to massive chrome ore and disseminated bird's-eye ore, *Minerals of Maryland* in 1940 mentioned a few common serpentine minerals such as magnesite, chalcedony, and the picrolite variety of serpentine, as well as the elusive gem-

my williamsite variety.[43] A few years later *Rocks and Minerals* gave more detailed descriptions in a similar listing. Both accounts state that most of the mine dumps had been hauled away for use as road ballast or fill.[44] Allen Heyl and Nancy Pearre visited the mine in the mid-1950s, documenting information to be included in their economic geology publications.[45] The map they prepared has been very helpful in interpreting the site. In 1980 minerals found at the Choate Mine and in Soldiers Delight were included in an educational series published by the Maryland Geological Survey. Talc, manganese oxides, calcite, and goethite round out the list of minerals from the mine.[46] More recently, *Rock and Gem* identified chromite and other minerals that could be found at the Choate Mine and in the vicinity.[47]

Significance of the Choate Mine

Future mining in Soldiers Delight remains impractical because of the small chromite resource identified and the Natural Environment Area land designation. Nevertheless, the chromite mining conducted at the Choate Mine is historically significant among Maryland's underground metal mines.

Operations at the Choate Mine, worked intermittently for almost a century, were typical of metal mining in Maryland in the nineteenth and early twentieth centuries. Mine owners encountered production problems, volatile prices, lack of ore, legal troubles, competition from richer mines elsewhere, and a host of other complications contributing to the speculative nature of the business.

In 1893 Brent Keyser, considering Maryland's copper mines, stated the situation well: "The parties in interest went through their due share of sanguine hope and realized woe. The machinery was crude, assays were unreliable, ready money was scarce, and most of the mines had to be worked in a semi-rural way, the miners farming during good weather and mining during bad. While, therefore, the product was insignificant as compared with that of the western mines of today, it doubtless represented, in its day, no mean engineering and financiering ability."[48] His words apply to Maryland's chromite mines as well. With all of their difficulties, these mines were able to produce important raw materials for the developing industries of their day. They will remain a significant

Buxton's Blueware on the fireplace hearth of the Red Dog Lodge. (Author's photograph, February 2001.)

Red Dog Lodge in a preserved state. (Author's photograph, 5 March 2005.)

and enduring part of our nation's mining history.

Acknowledgements

I wish to acknowledge several individuals for their contributions and support over the years in determining the history of the Choate Mine. Nancy Pearre Lesure (U.S.G.S., retired) provided her prior research notes and some key land records. Her encouragement of me (along with that of the late U.S.G.S. geologist Allen Heyl) in pursuing local mining history has been invaluable. All I can say is that they gave me a strong foundation from their research to build upon. Extant period photographs of eastern U.S. mines in my area are extremely rare. World War I-period photographs of the Choate Mine were generously provided by Jane Buxton Cameron through Colby Rucker. Colby and I mused that these photographs presented more questions than answers. He provided crucial information on John Buxton that added substantially to this article. My friend Ranger Fraser Bishop (Maryland Forest and Park Service, retired), of the Soldiers Delight Natural Environment Area, gave his time and support to my conducting of field research in both Maryland and Vermont and taught me how to successfully engage the public in interpretive programs. Even William Ricketts, in my high school "Discovering Our Buried Past" archeology class, planted seeds of interest in local history, including a field trip to the mine decades ago. Lastly, the late Vermont mining historian, writer, and photographer Collamer Abbott vastly expanded my interest in and knowledge of Isaac Tyson and his family enterprises and descendants.

Johnny Johnsson, a Maryland native, is an historian of the chrome mines of Maryland and Pennsylvania, the copper mines and smelting of Maryland and Vermont, and mining in several other areas. He is a long-time Mining History Association member, contributor of previous articles and reviews to the Mining History Journal*, chairman of the Rodman Paul Award Committee, and sponsor of the 2005 Mining History Conference in Scranton, Pennsylvania. His wife Dawn and children (now grown) have attended many MHA meetings. An earlier, abbreviated version of this paper was presented at the thirteenth annual Mining History Association Conference, held in Wallace, Idaho, in 2002. Johnny is a mining engineer employed in environmental permitting and compliance in the crushed stone industry.*

Notes:

1. Jacques Kelly, "Chromium Pioneer Honor: Quaker geologist Isaac Tyson, Jr. Inducted into the National Mining Hall of Fame," *Baltimore Sun*, 7 Sep. 1996. Well-researched analyses of Tyson's involvement in mining, smelting, and chemical manufacture may be found in: Collamer M. Abbott, "Isaac Tyson, Jr.: Pioneer Mining Engineer and Metallurgist," *Maryland Historical Magazine* 60, no. 1 (Mar. 1965): 15-25; Collamer M. Abbott, "Isaac Tyson, Jr.: Pioneer Industrialist," *Business History Review* XLII, no. 1 (Spr. 1968): 67-83.
2. Parker Cleaveland, *An Elementary Treatise on Mineralogy and Geology*, 2nd ed. (Boston: Cummings and Hilliard, 1822), 624; Nancy C. Pearre and Allen V. Heyl, Jr., "The History of Chromite Mining in Pennsylvania and Maryland," Pennsylvania 4th Geological Survey, *Information Circular 14* (Harrisburg, 1959), 6. Like Tyson, Dr. Allen V. Heyl, Jr., was inducted into the National Mining Hall of Fame in 2010 for his lifetime of significant work in economic geology (www.mininghalloffame.org/inductee/heyl).
3. Isaac Tyson, Jr., "Record Book of Deeds, Leases, etc., 1828-1849," Library of the Maryland Historical Society (Baltimore), 1825, 21.
4. Jesse Choate Phillips, "Choate Family of Baltimore County, Maryland" (unpublished family genealogy, Harrisburg, PA, 1979), 15. Your author has been unable to reconcile why a Baptist family such as the Choates would name a son "Herod." Even though the name, of Hebrew and Greek origin, means "son of a hero," the association with any of the Herods of the Bible is decidedly negative with respect to either infanticide or the beheading of John the Baptist. Apparently, Herod Choate was a normal, upstanding citizen.
5. "Baltimore County Land Records," Baltimore County Court House, Towson, Maryland (year, liber and folio given in references), 1830, liber WG 208, folio 178.
6. Isaac Tyson, Jr., "Old Memo and Journal, Isaac Tyson, Jr., 1833" (6 May 1833 to 7 July 1834), Vermont Historical Society, Montpelier, entry of 8 Mar. 1834, 93.
7. Tyson, "Record Book of Deeds," 1839, 75; Harald (Johnny) B. Johnsson, III, "Two Historic Metal Mines in Maryland," in: David K. Brezinksi and James P. Reger (eds.), *Studies in Maryland Geology—In Commemoration of the Centennial of the Maryland Geological Survey* [Maryland Geological Survey Special Publication No. 3] (Baltimore: Maryland Geological Survey, 1996), 71-86.
8. Isaac Tyson, Jr., "Memorandum Book, 1835-1852," Entry 46 of 17 Oct. 1843, 84, Tyson family archives, South Strafford, VT.
9. Mark Walston, "Maryland Inventors and Inventions, 1830-1860," *Maryland Historical Magazine* 80, no. 1 (1985): 85; United States Patent Office, "Improvement in Manufacture of Chromate of Potash," Letters Patent no. 4,224 to Isaac Tyson, Jr., of Baltimore, MD, 9 Oct. 1845.
10. "Baltimore County Land Records," 1860, liber 28, folio 80.
11. "Baltimore County Land Records," 1867, liber 64, folio 465.
12. Ware and Harris were local families from whom Tyson purchased the properties hosting these specific mines. In most later geological reports the Ware Mine is misspelled as "Weir," probably due to a particular pronunciation, causing confusion when trying to reconcile nomenclature.
13. Marie Forbes, *Speaking of Our Past: A Narrative History of Owings Mills, Maryland, 1640-1988* (Bowie, MD: Heritage Books, Inc., 1988), 294; *Baltimore County Advocate*, 12 Oct. 1861. The author has seen later records indicating barrels of chrome sand weighed closer to one thousand pounds.
14. Pearre and Heyl, "History of Chromite Mining," 14.
15. Lillian Bayly Marks, *Reister's Desire* (Baltimore: Garamond/Pridemark Press, Inc., 1975), 125.
16. W. H. Perkins, Jr., *Reports of Cases Argued and Adjudged in the Court of Appeals of Maryland*, v. 121 (Baltimore: King Brothers, 1913), 597-607.
17. Nancy C. Pearre and Allen V. Heyl, Jr., "Chromite and Other Mineral Deposits in Serpentine Rocks of the Piedmont Upland, Maryland, Pennsylvania, and Delaware," *USGS Bulletin 1082-K* (1960), 757.
18. Joseph T. Singewald, Jr., "Notes on Feldspar, Quartz, Chrome, and Manganese in Maryland," *Maryland Geological Survey* 12 (1928): 186.
19. Pearre and Heyl, "Chromite and Other Mineral Deposits," 735.
20. William Glenn, "Biographical Notice of James W. Tyson," AIME *Transactions* 31 (Feb. 1901): 118-21; "Copper Company Quits. Old Baltimore Concern Decides to Go out of Business," *New York Times*, 25 Nov. 1903.
21. "Baltimore County Land Records," 1907, liber 316, folio 175.
22. "Baltimore County Land Records," 1916, liber 471, folio 273.
23. Frederick A. Dolfield, "History of Chromium and the Maryland Chrome Corporation," 3 Jan. 1940, manuscript in the archive of the Baltimore County Historical Society, Cockeysville, MD, 1 p.; J. S. Diller, "Chromite," in U.S. Geological Survey, *Mineral Resources of the United States 1918*, Part 1 (Washington, D.C.: USGPO, 1921), 673-5.
24. "Baltimore County Land Records," 1918, liber 493, folio 500.
25. John H. Buxton, Highland Park, MI, letter to W. H. Carter, president, Winnipeg Electric Company,

Winnipeg, MB, 26 Jan. 1943, 2 (Buxton family papers, copy in the author's possession).

26. Buxton letter to Carter, 3.
27. Dolfield, "History of Chromium."
28. State of Maryland, Secretary of State, "Domestic Corporation Record No. 14," 7 Mar. 1918, Folio 81-82.
29. Marie Forbes, "Parker Recalls Chrome Ore Mines of Soldier's Delight," *Community Times* (Reisterstown, MD), 31 Dec. 1981, A4.
30. Colby Rucker, oral communication with the author, 1995. Colby Rucker (1937-2004) was a great nephew of John Buxton. He was family genealogist, finder and keeper of family archives, and an historian and accomplished naturalist.
31. Singewald, "Notes on Feldspar, Quartz, Chrome," 165, 187.
32. Dolfield, "History of Chromium."
33. Buxton to Carter, 3.
34. Dolfield, "History of Chromium."
35. J. Edward Hibline, "I Remember—Happy Days at Red Dog Lodge" (text of written remarks for the dedication of Soldiers Delight Natural Environment Area on 18 May 1975, in the files of Soldiers Delight Conservation, Inc., at the Soldiers Delight Natural Environment Area Visitors' Center, 1-3.
36. Ruth Buxton (John Buxton's wife), note contained in a letter from John H. Buxton, Jr., to his mother, Jane Buxton, 17 Sep. 1917 (transcript in the author's possession of letter privately held); Stoddard-Dayton Company story: www.owensvalleyhistory.com/stories3/stoddard_dayton_story.pdf; Stoddard-Dayton sales slogan, 1907, from an unidentified source and confirmed at: www.hemmings.com/magazine/hcc/2012/07/Slogans-and-Sayings/3714271.html
37. Ruth Buxton, letter to Annette Buxton (John's sister), 4 Mar. 1918 (transcript in the author's possession).
38. The State of Maryland's official seismograph is mounted to the shallow serpentine bedrock beneath the floor of Red Dog Lodge and provides real-time seismic data for the study of earthquakes and ground vibration: www.mgs.md.gov/seismic/site.shtml. Colby Rucker donated the "blue granite-ware" to Ranger Fraser Bishop at Soldiers Delight in 1994.
39. "Baltimore County Land Records," 1920, liber 533, folio 135; Walter Harvey Weed, "Maryland Chrome Corporation," in *The Mines Handbook* XIV (New York: W. H. Weed, 1920), 746.
40. E. K. Judd, "The Tyson Tract and Adjoining Areas at Soldier's Delight, Baltimore County, Maryland," magnetometer survey station map, Jan. 1931, in the files of Soldiers Delight Conservation, Inc., at the Soldiers Delight Natural Environment Area Visitors' Center.
41. Slavoljub D. Maksimovic, "Recovery of Chromite Deposits in Maryland and Pennsylvania," (U.S. Bureau of Mines, Pittsburgh Research Center, *Internal Report 4459*, June 1984), 48 pp.
42. Jeffery Peter Miller, "Very Low Frequency Electromagnetics and Geochemistry in Exploration for Chromite Mineralization, Soldier's Delight Chromite District, Maryland" (Ph.D. diss., George Washington University, 1987).
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48. R. Brent Keyser, "Copper," in *Maryland, Its Resources, Industries, and Institutions: Prepared for the Board of [Chicago] World's Fair Managers of Maryland* (Baltimore: The Sun Job Printing Office, 1893), 114-5.