

THE COOJOOT GRAPHITE MINE

SOUTH KINGSTOWN, RHODE ISLAND



**PREPARED FOR
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Introduction

The abandoned Coojoot Graphite Mine is found on a ridge of land that rises from the west bank of the Narrow River in the Tower Hill section of South Kingstown, Rhode Island. Although documentary evidence for most of the activity associated with this mine is very thin, it demonstrates a centuries-old pattern of infrequent commercial activity and long periods of quiescence. The intent of this report is to survey and analyze this documentary evidence and, coupled with analysis of the surface remains of industrial activity there, provide a narrative history and point out likely areas for future documentary and archaeological investigation.

Land development and natural forces have obliterated much of the surface evidence of historic Rhode Island mining. Among thirteen Rhode Island graphitic coal mine sites, only Coojoot retains any physical evidence of mining activity (see Table 1). Early land evidence associated with the Pettaquamscutt Purchase in 1657 makes mention of an existing “black lead” mine utilized in some manner by the Narragansett Indians, from whom all of South County was purchased. This deed also bears the only reference to the Narragansett place name, Coojoot. Although the name has been spelled variously as *Cajoot*, *Cajout*, and *Cojoot*, this report will use the spelling taken from the earliest deed. The reference to graphite as *black lead* in this deed reflects a longstanding misconception of the composition of graphite and the various names for the mineral demonstrate that the misconceptions have been as durable as the material itself. The following section of this report will attempt to clarify these terms in the context of Coojoot.

Graphite

Graphite is formed in a geological process called *coalification*, whereby peat deposits are altered over millions of years, through heat and pressure, in successive stages to lignite, bituminous coal, anthracite, meta-anthracite, and, finally, graphite. At each stage some of the volatile gases are released, leaving behind a successively higher percentage of fixed carbon. Although closely related to anthracite coal—and even sold as such in Rhode Island--the distinct silver-black coloration, unctuous texture, and substantial weight of the material linked it empirically to lead. The mid-18th-century term *plumbago*, derived from the latin word for lead, *plumbum*, reflects that perceived link.

A. G. Werner, a German mineralogist and chemist, coined the modern word graphite in 1789. Derived from the Greek *graphein*, to write, it was so named because of an understanding already extant at that time that the material served as a writing material.¹ While the terms *graphite* and *plumbago* were used interchangeably after about 1800, over the next century a cleavage in meaning occurred that came to characterize plumbago as the crystalline form of the mineral, and graphite as the amorphous form. While the vast, high quality deposits of modern day Sri Lanka (formerly Ceylon) and those of upstate New York are crystalline in form, the graphite deposits of the Narragansett Basin are of the amorphous type. Despite a well-established scientific and commercial understanding of carbon as the essential component of Narragansett Basin graphite, use of the common names “lead,” “black lead,” and “plumbago” persisted into the 20th century.

Commercial uses for graphite have evolved and expanded over the centuries. The utility of graphite as a facing for foundry molds was well known in the 17th century. By the turn of the 18th century, the mineral’s utility as a means of writing was also spreading. In the 19th century

American pencils were mass-manufactured; rods formed from a mixture of clay and powdered graphite were inserted into bored-out wooden tubes. The refractory qualities of graphite also led to its use as a crucible material by the mid-19th century. Graphite was also used as a paint base and as stoveblack. It should also be noted that the high variability of Rhode Island graphitic coal (discussed below) encouraged 19th- and 20th-century entrepreneurs to mine and market the mineral as a fuel despite decidedly mixed performance.

The rapid expansion in the late 19th century of research and experimentation in the new field of practical electricity led to the discovery that graphite was a very good conductor and that its natural lubricating qualities suited it well for commutator brushes in electrical generators and motors. The expansion of the steel industry in the post-Civil War years also led to an increased demand for graphite as a lining material for crucibles used in the Bessemer process. Modern uses include graphite as an additive to steel, as an ingredient in adhesives, in high-heat applications, as a lubricant, and as a moderator in nuclear reactors. The introduction of new uses and markets has often caused a reconsideration of the profit potential of abandoned or marginal mines.

The likely use of Coojoot graphite before the ca 1900 improvements visible today at the site was for foundry facings. Although we have little evidence as to the intended uses for Coojoot graphite, we do know that an associated mine in Cranston marketed its product in the late 1890s as a paint base, especially adapted for use on smokestacks and structural iron work, for use in pencil manufacture and for foundry facings.² The following is a rough chronological summary of known activity at Coojoot.

Chronology of Coojoot mine activity

Woodland era to 1657	Native American use
1657 to pre-1727	Colonial use, likely for foundry facings
1800 ca	Relatively recent work at mine described by C.T. Jackson in 1840
1894-5	New England Mining Co. operates mine for Mrs. E. B. Carver
1900-3	American-Ceylon Graphite Company franchise agreement with Mrs. E. B. Carver

Native American graphite use

Although we know very little about the use of this mineral by the Narragansett Indians, a few general assumptions can be drawn from the language of the Pettaquamscutt Purchase deed: "They also grant them all the black lead in this title, and in a place called Coojoot."

Twenty-one years after the settlement of Providence in 1636, five Anglo settlers purchased from three Narragansett sachems an area that includes all of present-day Narragansett and South Kingstown and parts of North Kingstown and Exeter. The fact that a deposit of graphite was mentioned specifically among all the possible resources of such a large land area suggests that the Narragansetts, the Purchasers, or both parties were well aware of its value.

As for the origins of the word Coojoot itself, Sidney Rider, in his self-published 1903 study, *The Lands of Rhode Island as the Sachems Knew Them*, speculates that

this word, like Pojack, and Cajacet, may belong to some other dialect than the Narragansett. There are but two words, both practically the same, given by Williams, in which the letter J occurs.³

Rider is making reference to Roger Williams' *Key Into the Language of America*, a study of the Narragansett Indian language published in 1643. Although this work makes no mention of the Coojoot mine, Williams included the word *metewis*, defined as "black earth," and noted a related locale in western Massachusetts called *Metewemesick*.

Williams did not define black earth beyond placing its definition in the chapter titled "Of their paintings,"⁴ but his reference to this locale in the western part of the Massachusetts Bay Colony suggests that it may be in the vicinity of, or the same place that the Nipmuck Indians called *Tantousq*, situated 60 miles west of Boston in the southwest of the present-day town of Sturbridge.

The few Anglo references to the possible uses of graphite by the Narragansetts conclude that the uses were ornamental or ceremonial, rather than practical.⁵ Graphite Native American artifacts have been found in four Rhode Island archaeological sites dating to the late 17th century.⁶ One, found in a gravesite in North Kingston, was a piece roughly 2" in diameter with a recessed shape of a turtle. This appears to be a casting mold, raising the interesting possibility that the Narragansetts had discovered empirically that graphite was a workable foundry mould material that effectively released the casting from its mold.

Ed Hood, research historian at Sturbridge Village, wrote a study of the Tantousq mine in 1998. Although his discussion of Native American use of the material was limited, he described pieces of graphite along with arrowheads and stone tools found in 20th-century archaeological investigations. Among them was a "Native American graphite artifact ...shaped into a pendant [with a] hole drilled through it so that it could be hung from a string."⁷

Beyond these uses is the possibility that the Narragansetts used graphite in tattooing. Brenda Elliott, in her corporate history of the Dixon Ticonderoga Company,⁸ discussed the use of graphite as a coloring medium in Native American practice: "Tattooing, mentioned in many

accounts by the early explorers, was a custom which 'prevailed to a greater or lesser extent all over the entire country.'" She described the process by which graphite was used:

The permanent designs were first traced onto a fleshy or muscular part of the body using charcoal or other such medium. The lines of the design were formed by puncturing the skin and pressing until the blood started to flow; at one time or another, sharp flint points, fine fish-teeth, and bone or steel needles were used for the purpose. Next, either vegetable or mineral dye was rubbed deep enough into the wound so that, when it healed, the design would be permanent under the skin.⁹

It is unknown at this writing whether the Narragansetts had a tradition of tattooing that might have used local graphite. Future archaeological investigation could reveal evidence of Native American activity at Coojoot. To date, physical investigations of Coojoot have been limited to the surface remains of late 19th and early 20th-century industrial activity.

Commercial exploitation

With few exceptions, documentary evidence on this mine for the period of Anglo ownership and use is very thin and this evidence generally restates the few facts that are known. Still, some conclusions can be drawn from this record. A survey of this documentary evidence follows.

One of the original Pettaquamscutt Purchasers was John Hull (1624-1683), a gold- and silversmith from Boston who was associated with the establishment of the first Massachusetts Bay Colony mint, built on his property in Boston in 1652. Hull invested in a number of properties other than Pettaquamscutt, most in the Boston area. Although he never lived in Rhode Island, his signature on a deed that made specific reference to a black lead mine within the area of the purchase suggests that he was aware of the economic possibilities of the mine.¹⁰

The existence of graphite outcroppings was well known in the early years of the Massachusetts Bay Colony. John Oldham set out in 1633, three years after the formation of the colony, to explore the lands of the western interior. He stayed in Indian villages along the way and was brought by the Nipmucks to Tantousq to see the graphite outcropping. As stated above, twentieth-century archaeological investigations in these areas of Nipmuck settlement suggest that the graphite was used for ornamental, rather than utilitarian purposes.

In 1644 John Winthrop, Jr., the son of the governor of the Massachusetts Bay Colony, purchased Nipmuck land at Tantousq for the purpose of mining graphite. At this early date, the likely use of the mineral would have been for foundry facings. The practice of coating foundry molds with pulverized graphite to more easily release metal castings from their molds was well established in England by the 17th century.¹¹ This treatment of foundry molds also rendered a smooth surface on the finished casting.

Fourteen years after Winthrop's purchase he described the difficulties of mining at Tantousq:

There is some black lead digged, but not so much as they expected, it being very difficult to gett out of the rocks, which they are forced to break with fires, the rocks being very hard and not to be entered further than the fire maketh way, so as the charge hath become so greate in digging of it that I am like to have no profit by the same.¹²

Little did Winthrop know that this characterization could serve as a broadbrush summary of the next three hundred years of New England graphite mining. Later exploitation of the Sturbridge mine revealed that the graphite deposit was narrow and nearly perpendicular. This, the physical difficulties of manual mining techniques, and its remote location likely ensured the mine's marginal profitability in the 17th and 18th centuries.

William Davis Miller's 1931 article, *Some Ancient Roads in the Pettaquamscutt Purchase*, offers some insight into Coojoot in the years after the purchase. Based on a surviving fragment of the 1727 James Helme Plat,¹³ Miller identified a connector road between present day Tower Hill and Middle Bridge Roads as "the former way to the Lead Mine."¹⁴ Miller also quoted from depositions made in the same year by brothers Benoni and Henry Gardiner and speculated that the map and the depositions were associated with the "drawing and laying out" of early South Kingstown roads. This connector road appears to be the general location of the present day 100' right of way from Middle Bridge Road to the mine site (now overgrown). Quoting from Miller:

...Benoni states that, "there was one Highway laid out by the Lead Mine from the upper highway at the head of the Lotts down to the highway at the foot of said Lotts." Henry Gardiner states that it was formally laid out "for the convenience of going to sd Lead mine." It was originally laid out with the generous width of 20 rods [330 ft.]. However, the lead mine, known by the Indians as Cajoot, does not appear to be as valuable as expected and "afterwards the said Purchasers gave four Rods [66 ft.] in width on the north part of Sd Twenty Rods [road] from the lower highway to the Country Road afore mentioned for the use and benefit of the Town and the remainder part of said twenty rods the Sd purchasers conveyed to Thomas Mumford...in part to pay for John Mumford surveying." The road, as well as the mine, fell into disuse and first the portion from the mine to the river road ceased to appear on contemporary plats and later the remainder.¹⁵

From these observations we can draw a few conclusions. It is likely that the mine was not in use in 1727, but had been worked within the living memory of Benoni and Henry Gardiner. Future research on area foundries could estimate the market for foundry facings or "moulding dust" after the Pettaquamscutt Purchase.¹⁶

19th-century exploitation

From this point we jump ahead to 1839, when the Rhode Island General Assembly allocated funds for a study of the state's mineral deposits. This work, conducted by Charles T. Jackson, was published a year later as a *Report on the Geological and Agricultural Survey of the State of Rhode Island*. Although Coojoot was in one of its lengthy periods of quiescence at the time of the survey, Jackson described an unnamed mine at Tower Hill in Kingston:

Plumbago is found here in several places and has been wrought to some extent for supplying moulding dust for iron founders. Thirty tons of this substance have been raised at one time by digging only four feet into the rocks in the orchard, upon the hill side.¹⁷

If Jackson's field notes exist, they could shed more light on the period and extent of this operation that raised thirty tons of graphite. Otherwise, this brief description of mining at Tower Hill raises as many questions as it answers. We can surmise, however, that the commercial

operation he described occurred within several decades of his report and that the utility of graphite in foundry operations was well known to Rhode Islanders before 1840.

There is no evidence confirming any commercial exploitation at Coojoot in the next several decades following the publication of Jackson's report. Despite this lack of documentary evidence, there may have been continued exploitation of the mine for foundry facings during the years that the Watson family worked the farmland that included the mine. Further research into market conditions during the Civil War may show an increased demand for graphite for military purposes and a related increase in activity at the mine.

The approximately 160 acres of South Kingstown land that included the graphite mine came into the possession of the Watson family some fifty years after the Pettaquamscutt Purchase and remained in their hands for five generations (1708 to 1887). Along with this larger property was a 14-acre hillside orchard called Side Hill Farm. This long occupation by the Watsons ended in September 1887 with Jesse Van Buren Watson's sale of the larger property and Side Hill Farm to Emma B. Carver, a widow from Pennsylvania. Carver also purchased other properties in the area. It is unknown whether Mrs. Carver actually resided on the former Watson land; it is known that she maintained a cottage at Narragansett and was often contacted in New York City. Seven years after her purchase of the Watson Farm, Carver came into contact with Providence businessman J. Mason Gross.

J. Mason Gross and the New England Mining Company

John Mason Gross was born in Hartford in 1834. In 1863, at the age of 29, he relocated to Providence and within a few years had formed the Providence Saw Works. This company over time became the Providence Saw and Tool Works, manufacturers of movable tooth and planing saws.¹⁸

By 1892 Gross was operating four businesses out of an office at 26 West Exchange Street. His primary business, under his own name and advertised in the 1892 *Providence City Directory*, was the manufacture and sale of "cotton, woolen, iron and wood working machinery." Advertised below were three subsidiary operations--included among them the New England Mining Company: "miners and manufacturers of graphite and crude lead." J. Mason Gross was the treasurer.¹⁹

A partial run of Gross's journals between 1886 and 1903--especially his entries for the years 1894 and 1895--provide a remarkable and sometimes poignant look at his involvement with Mrs. Carver and the Coojoot mine. The first journal entry that links Gross to the Carvers is dated April 7, 1894: "wrote Dr. Carver [son of Emma B. Carver]...of New York in regard to graphite at Narragansett Pier." Gross, likely aware of the existence of the graphite deposit, may have initiated the business contact.²⁰

On May 9, Gross met the Carvers at Narragansett Pier. They drove out to the mine and "found some fair specimens of graphite near the house and barn." Gross "[e]xpressed the opinion that there was a large deposit which might pay to work--300 to 500 dollars would probably determine it." A few weeks later he made a proposal to Emma Carver that he would be willing to

manage a mining operation on her property, but was unwilling to provide financial backing. On May 25 Gross wrote:

Called on Mrs. Carver today—talked over the project of opening up the mine—she is very desirous that it should be done and thinks my proposal a good one. If the material is there she wishes to have the property developed and says she wants me to take the management of the business. I told her I might possibly arrange to take the management and if so, I would do everything but undertake the financial part of the business, I could not do that. She said she could arrange to meet the expenses of doing the business if I could take the management.

Carver and Gross reached an agreement. Gross placed an associate, A. J. Angell, in charge of the operation at South Kingstown and brought him out to the mine in early June. A month later, the *Narragansett Times* of July 6 printed the following local news item: "A company from Providence has opened up a mine on the Carver farm, at Tower Hill, where they are mining for black lead. Up to date but a small quantity has been secured."²¹

ADVERTISING DEPARTMENT. 1097

J. MASON GROSS,
—MANUFACTURER AND DEALER IN—
Cotton, Woolen, Iron and Wood Working Machinery.
Also APPRAISER OF MACHINERY
For Purposes of Insurance, Taxation, or Loss by Fire.
26 EXCHANGE PLACE, PROVIDENCE, R. I.

New England Mining Co.,
—MINERS AND MANUFACTURERS OF—
Graphite & Crude Lead.
26 EXCHANGE PLACE,
ROOM NO. 11. *Providence, R. I.*

UNION MACHINE CO.,
—MANUFACTURERS OF—
BUDLONG'S
Turning, Boring & Gear Cutting Attachment
FOR
IRON PLANERS,
OFFICE: **26 EXCHANGE PLACE,**
ROOM NO. 11. **PROVIDENCE, R. I.**

The Cleigh Process Co.,
—CONVERTERS OF—
IRON AND STEEL,
OFFICE, 26 EXCHANGE PLACE,
ROOM NO. 11. *Providence, R. I.*

Figure 1

From the 1892 *Providence Directory and Rhode Island Business Directory* showing the four companies operating out of the office of J. Mason Gross

This quantity of graphite described in the item contradicts an earlier journal entry (June 28) in which Gross, on a visit to the mine, described the “tons piled up.” It is likely that the piles Gross described at this early phase of the operation were brought to the surface by primitive means. A few weeks later Gross traveled to Boston to the offices of S.S. Holt and Company to discuss the purchase of a steam engine and boiler for the mine. The day after his Boston trip he met with Mrs. Carver and recommended that the mine be capitalized at a minimum of \$5,000, although “\$10,000 would be better.” He estimated that a building and necessary machinery would cost \$3,000.²²

Even at this early stage in his arrangement with Emma Carver, Gross sensed looming financial difficulties. Before his investigation into an engine and boiler he had advised her on July 10th “...not to continue the enterprise if in any way it would be likely to...cramp her in money matters.” The two decided to continue.

During August Carver and Gross discussed refitting the existing barn on the property as a processing building. The subsequent decision to erect a new building was acted on quickly; by late August the foundation was complete. The *Times* printed the following local news item on September 14:

A building thirty by eighty has been commenced on the farm of Mrs. E. B. Carver at Tower Hill, to be used as a lead mill. Angell and Co. of Providence are having it put up. J. W. Brown has the contract. A large quantity of lead has already been taken out.²³

Another local *Times* news item in October of that year described an accident in which a workman fell from the roof of the “new mill” at the Carver farm.²⁴ South Kingstown tax books show an increase in valuation for the farm from \$3650 in 1894 to \$5000 in 1895, a 37% increase.²⁵ This increase in valuation represents Emma Carver’s investment in the factory building.

In early September, after a discussion with Carver about the benefits of new vs. used machinery, Gross ordered the mine’s engine and boiler from S.S. Holt. An undated entry in the back of Gross’s 1894 journal lists the following equipment at the mine:

Engine 30 HP, Boiler 40 HP, Pump, Crusher, Pulverizer, Screws, Elevator, Shafting, Belts²⁶

Although later journal entries make reference to machinery installed at the mine, it is not known whether this was a list of actual equipment purchased or part of the calculations that contributed to his recommendation of a \$10,000 capitalization. A few years later, when Gross was associated with another graphite mine in Cranston, an item in the *Engineering and Mining Journal* described the mining process used at that time. We can make an educated guess that the operation at Coojoot was similar, although of a smaller scale:

The complete process for handling the raw material is as follows: The graphite, when hauled from the mine, is crushed, carried by a conveyor to the drying furnace, from there to the pulverizer, and thence to the different meshes, when the product is ready for market.²⁷

The lack of any reference in Gross's equipment list to a drying furnace suggests that the graphite mined at Coojoot may have been piled at the surface for air drying. Arthur Emmons in his 1885 *Notes on the Rhode Island and Massachusetts Coals* noted

...the striking peculiarity (hitherto unnoticed in anthracite coals, or, I believe, in any coals) of quickly taking up a large percentage of water under a moist condition of the atmosphere and as readily parting with it under a dryer condition of atmosphere...²⁸

This peculiar characteristic of Narragansett Basin coals may explain the absence of a drying furnace at Coojoot.

Gross did not make any entries as to the installation of the equipment and his journal makes scant reference to any actual sales of graphite. For example, a November 26 entry makes note of the shipment of five barrels of pulverized graphite to "several parties." Documentary evidence from 1900 (discussed below) further substantiates, however, that Coojoot was outfitted with a complement of unspecified machinery between 1894 and 1895.

Journal entries for October and November of 1894 describe mounting financial and practical difficulties. Gross noted that Carver was "very short for money" and that "Angell needs money as his capital is small."²⁹ For reasons probably financial in nature the mine was shut down on December 15. In late January of 1895 Gross made the following entry:

Called this p.m. to see Mrs Carver. She said that it was very hard to get money and as the expenses were larger than she expected was obliged to shut down. She said the trouble was that Mr Angell was not up to doing the work. Also said she was satisfied with the machinery I had purchased. She had no fault to find with it. Would not start up until March. Cannot send me any money at present...

The relationship between Gross and the Emma Carver deteriorated around this time. Near the time of the anticipated start-up date, Gross received a letter from Carver that he considered a "great insult." He gave no further explanation in his journal other than to note that he had forwarded the letter to his attorney.³⁰ Further correspondence between Gross and Carver was carried on through the attorney. A cryptic entry in May 1895 notes receipt of a claim settlement from Mrs. Carver.³¹

The mention of "trouble in the mining camp" in the autumn of 1895 and the end of any specific reference to Carver or the mine in journal entries post-September 30 suggest that the New England Mining Company's operation at Coojoot lasted about 18 months, during which time a substantial operation was set up and eventually shut down for a number of reasons that could include a lower than expected yield, purity and quality of the graphite, undercapitalization and constant cash shortage in the depressed economy that followed the Panic of 1893, and labor trouble.

The New England Mining Company's last directory listing is 1897. In August of that year the *Providence Journal of Commerce* published an article on the formation of the Rhode Island Graphite Company. This company was set up to exploit a 7-acre mine site in Cranston.

Capitalized at \$250,000, the President of the company was “former tobacconist” J. B. Kinney; J. Mason Gross was Vice President.³²

The American-Ceylon Graphite Company

In March of 1900 Emma Carver, described by this time as a resident of New York City, entered into a 40-year agreement with the American-Ceylon Graphite Company (ACGC), a New Jersey-based corporation chartered in 1897.³³ The contract between the two parties, found in South Kingstown land evidence,³⁴ offers considerable insight into Mrs. Carver’s continued ambitions for Coojoot as well as the declared capabilities of ACGC. The contract describes a

...tract of land containing deposits of graphite in unknown quantities; there being also on said property a certain factory building with certain machinery for the treatment of graphite, and there being erected on said land a barn and dwelling house, the use of which factory building, barn, and dwelling house being incorporated in and subject to this agreement...

The contract’s reference to pre-existing machinery for “treatment” indicates that New England Mining Company had left behind the processing equipment that, according to the original arrangement with J. Mason Gross, belonged to Carver. No mention is made, however, of outdoor equipment (elevator, screws, cars, etc.) that would have been used in extraction and transport of the ore. The reference to three buildings is consistent with those shown in Figure 2 and, according to the contract, one of them was to be used as mine-related housing. There is some inconsistency, however, in the contract’s description of a dwelling house among the three buildings on the site: according to the conventions of the Everts and Richards map, none of the three buildings was a dwelling in 1895. Archaeological investigation in the vicinity of the two buildings closest to Middle Bridge Road may reveal evidence that one of them was the Watson farmhouse, used between 1894 and 1903 as either worker housing or in some capacity associated with the mine. A reference to “cottages” in Gross’s journal indicates that some type of modest or temporary housing may have been built during the New England Mining Company period.

According to the terms of the forty-year contract, Carver was to receive a royalty of \$1 per ton of crude graphite mined, “the said graphite to be mined and carried away—shipped, sold, disposed of in the crude, crushed, pulverized and other forms.”³⁵ The contract added that the graphite was to be weighed before entering the crusher or before shipment. ACGC was apparently optimistic in its projections of the mine’s yield: Carver was promised an annual payment of not less than \$2000, which, by extension, meant that the company comfortably projected a minimum of 2000-tons annual yield.³⁶

The contract also permitted ACGC to prospect other parts of the Carver land although it makes clear that “forest trees are not to be molested unless necessary to remove and use same in the mining of graphite.” Although there is no specific mention of the means of transporting graphite, the contract language raises the possibility that ACGC shipped the mineral to market by boat:

[ACGC] shall also have whatever rights of access to the [Pettaquamscutt] river from the aforesaid property now possessed by [Carver] for the cartage of merchandise and the storage of same and shall have the right to erect additional factories, warehouse, storage buildings and dwelling houses...³⁷

The only published history of Coojoot is contained in a short essay published in 1939, *Coojoot—A Graphite Mine in South Kingstown*, written by Paul Francis Gleeson of Coventry (1910-1975).³⁸ While conducting research for the article in 1938 Gleeson corresponded with Thomas G. Hazard, who had acquired the Watson and Side Hill Farms from the Carver estate in 1908. Although Gleeson's description of the extent of 1894-1903 commercial activity at Coojoot is very limited, it is possible that Hazard's 1938 correspondence contains more detail on the elements of the operation that were still standing and visible when he acquired the property thirty years earlier. Drawing from Hazard's recollections, Gleeson wrote:

During her ownership Mrs. Carver executed a mining franchise to a graphite company [ACGC] which hoped to work the deposits. It is believed that this company was responsible for extending and deepening the shaft as well as installing a narrow gauge railway to connect them. Although some mining was done and although an effort was made to float bonds on the New York market, the venture was unsuccessful due to the heavy expense and the small chance for profit.³⁹

Gleeson's description of an extended and deepened shaft was likely drawn from Hazard. Although there is no obvious evidence today of a shaft of any significant length, a booklet published in 1969, *Rhode Island Mines and Minerals*, describes a "400' shaft and several openings"⁴⁰ at the mine. The only visible shaft at present is the roughly 20' tunnel off the south wall of the north pit. The absence of any indication of rail tracks on the 1895 map suggests that if there was a light gauge rail, it was built later by ACGC.

The American-Ceylon Graphite Company failed in 1903. New Jersey corporate records list non-payment of taxes as the cause of failure. A search of New York-based *Engineering and Mining Journal*, a magazine that regularly reported on graphite mining in the northeastern United States, turned up no mention of the company for the six years of its existence. It is unknown at this time whether the company invested in other mines in the United States, Canada, or Ceylon. Emma Carver died around 1903 and her sons, the executors of the estate, were apparently unwilling to pursue graphite mining.

The sale of the Carver estate to Thomas G. Hazard in 1908 marked the last of any attempts to mine graphite at Coojoot. About thirty years after the sale, the Rhode Island volume of the WPA *American Guide* series (1937) described the abandoned mine at Coojoot as "unsafe to visit." The 1938 hurricane may well have brought down what remained of the mine's standing buildings and structures. Although Gleeson's account two years later added little to this general assessment, he did describe a brief, but unfruitful reconsideration of the mine's economic potential in the context of high mineral prices during World War I.

It is an interesting coincidence that the same year that Hazard purchased the Carver property the *Providence Sunday Journal* published an article entitled, "Mining an unprofitable business in Rhode Island." In describing the entrepreneurial zeal of local mining investors, the article cautioned that

[i]n a number of instances the owners of the land have mortgaged their farms and secured the savings of neighbors to work the mine with the invariable result of having in the end a gaping hole in the ground while the promoter, effectively cured of the get-rich-quick fever, has dropped the role of miner or mine owner to retire to the prosaic life of farmer or small merchant where returns are more certain.⁴¹

Maps and documentary evidence of the physical layout of the mine

The 1895 Everts and Richards Atlas Map (Figure 2) is the only known image showing any elements of the mine. The buildings are configured along the historical right-of-way described in Wm. Davis Miller's *Some Ancient Roads in the Pettaquamscutt Purchase* and shown in the surviving fragment of the 1727 James Helme Plat. In 1895 there were three buildings at the site in the vicinity of the label *Mrs. E. B. Carver Lead Mine*. The crosshatch markings on these buildings and the yellow coloration on the original identifies them as wood frame "sheds, barns, etc."⁴² Although the buildings are not drawn to scale, their relative size and location can be estimated. The map shows two smaller buildings grouped on either side of the right-of-way about 300' from the Middle Bridge Road entrance to the mine site. A third and larger building is shown to the northwest of the right-of-way and about 600' from Middle Bridge Road in the general vicinity of the surviving foundation walls shown in Figure 3. The 1900 contract between Carver and ACGC describes a "factory building, barn, and dwelling house" on the Carver property. This indicates that the 1895 map could depict an older dwelling (converted for industrial purposes or empty at the time of the survey), the new factory building, and the Watson barn.

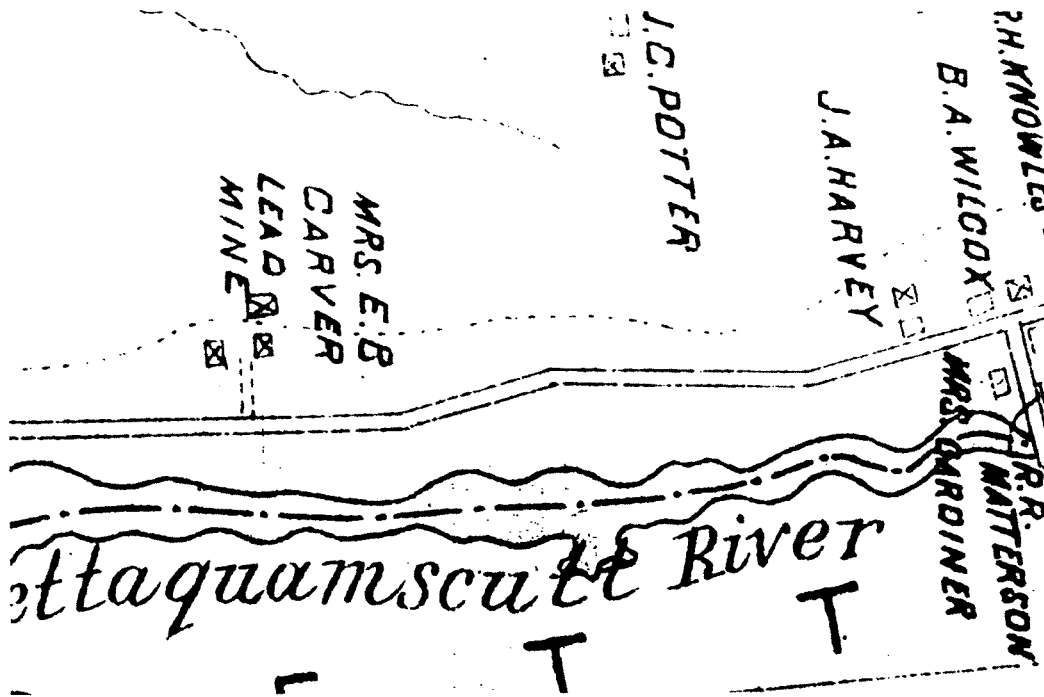


Figure 2
Detail from Everts and Richards Map (1895) showing
three utilitarian buildings on the Carver property

Graphite occurrence in Rhode Island

In 1910 the Rhode Island Bureau of Industrial Statistics described three geological processes by which graphite is formed:

- 1) heat and pressure of metamorphic agencies render more or less hexagonal flakes in limestone and gneisses,
- 2) chemical reaction renders a nearly pure carbon graphite in granitic veins [as in Sri Lanka], and
- 3) metamorphic action of heat and pressure on peaty deposits expels the volatile material leaving graphite deposits in carbonaceous, sedimentary rock.

Rhode Island graphite is of the third type. The report added that in the Rhode Island occurrences, "the percentage of ash that may come from the original intermixture of muds or later quartz veins runs very high, and the percentage of fixed carbon is correspondingly lower."⁴³ These qualities--the high ash and moisture content in particular--may account for the decidedly mixed success of coal and graphite mining in Rhode Island.

The same report tabulated the results of chemical analyses of graphite taken from the Fenner's Ledge mine in Cranston, noting that this material "may be taken as a type of the occurrence of graphite in Rhode Island." The six samples showed a range of carbon content from a low of 25% to a high of 64%. In his 1915 study, *Rhode Island Coal*, George Ashley pointed out that

The coal of Rhode Island is extremely variable in character and quality, ranging from anthracite to graphite, and containing moderately high ash to very high ash, and usually a very high percentage of moisture when first mined.⁴⁴

There are approximately 19 locations throughout the state where graphite has been discovered. Thirteen of these locations, listed below, have been worked commercially to varying degrees.⁴⁵ Although some of the mines were worked at different periods for either coal or graphite, this list shows the occurrence of commercially exploited graphite mines throughout the state and their current physical condition:

Table 1
(information gathered from Miller and Hermes, 1971)

<u>TOWN</u>	<u>COMMERCIAL OR COMMON NAME</u>	<u>STATUS</u>
Jamestown	Jamestown Graphite Mine	Filled
Portsmouth	Case Coal Mine	Filled
Portsmouth	Portsmouth Coal Mine	Filled
Valley Falls	Valley Falls Mine	Filled
Cranston	Arlington Graphite Mine	Filled
Cranston	Fenner's Ledge	Filled
Cranston	Sockanosset or Cran. Coal Mine	Filled
Lincoln	Dexter Lime Quarry	Filled
East Prov.	Phillipsdale (Bucklin Pt.)	Inactive

Pawtucket	Bensley Point	Inactive
Providence	Windmill Hill	Inactive
N. Kingstown	Saunderstown	Inactive
S. Kingstown	Coojoot	Inactive

Note: Correspondence from the Patten Papers (folder 201 RIHS manuscripts collection) tells of a plan to work a graphite mine on the Almy Farm in Little Compton. This undated correspondence likely dates to the mid 20th century. For lack of information, this mine has not been included in this list. Other references to a graphite mine “four miles south of Tiverton” suggest that this may be the same occurrence.

Over the course of the 19th and 20th centuries these thirteen Rhode Island graphitic coal mines were exploited at various intensities in different parts of the Narragansett Basin.⁴⁶ A number of these mines were what Harry Chase has called “switch hitters,” in the sense that market conditions determined whether the mined material was sold as a heavy coal or for industrial purposes we now associate with graphite.⁴⁷

A mine in the Arlington section of Cranston, the most successful and largest of Rhode Island’s graphitic coal mines, was closed after a 1959 cave-in. All surface remains of that mine were lost in the construction of Garden City in 1963.

Physical evidence at Coojoot

Beyond the possibility that the existing pits may have been used by the Narragansett Indians, there is at present no evidence of pre-1657 activity at Coojoot. Evidence of late 19th-century graphite mining includes two substantial pits, wells, waste rock piles, a possible narrow gauge railroad berm, building foundation walls, and other minor features. Dense undergrowth surrounds much of the area and future clearing is likely to reveal more features.

The two pits are located 600’ apart in a rough north-south axis at the top of a ridge that rises from the banks of the Narrow River. The south pit forms a rough circle of about 50’ and is at present about 20’ deep. The north wall exhibits a recess that could be a filled-in shaft entrance. A drainage ditch of about 400’ in length extends generally eastward down the slope of the ridge. The north pit, perhaps the older of the two, is at present roughly 75’ in length and 50’ in width, although there is anecdotal evidence that it was partially filled in recent years. The pit is about 30’ deep. A roughly 20’ sideshaft is located on its south wall. There is a concentration of waste rock, the apparent product of some kind of mechanical processing, along the east wall. Mike Winter, whose family owned the property from the 1970s until recently, has described a deep shaft off the north pit, now covered with fill. This may be the 400’ shaft described in Morrill and Stone’s 1969 *Rhode Island Mines and Minerals*.

Two known areas with building foundations are found in the vicinity of the north pit. At the top of the ridge and immediately west of the north pit is found the likely site of the main building associated with the mine. Although some 90-degree corners exist, the petering out of existing foundation walls suggests that some stone may have been removed over the years for other purposes. This appears to be the foundation of the 30’ x 80’ “factory building” described in the

1894 *Times* item. The most striking visual elements of this foundation are the granite stairwell and foundation corners pictured below.



Figure 3
Stairwell and foundation corners west of north pit

Within this foundation is a circular arrangement of stone that suggests an internal well of some kind. Northwest of these remains is found a smaller foundation wall of unknown use. The use of a steam engine and boiler at the mine normally required either a separate engine house or a walled division within an existing building. These foundation walls, a short distance from the larger foundation, may be related to the mine's steam plant.

To the south and east of the north pit and north of the stone wall that defines the right of way, there are foundation remains and a stone well that could correspond roughly to one of the three buildings shown in the 1895 South Kingstown map. These could be the remains of the Watson farmhouse, which appears to have been converted to industrial use between 1894 and 1903.

A substantial berm composed of what appears to be waste rock, is found parallel to Middle Bridge Road at the base of the ridge near the rear lot lines of the houses lining the road. The only sizeable piece of metal found so far is a *U*-shaped piece of iron or steel protruding from the southern terminus of the berm.

Suggestions for future research

Documentary research:

1. There is very little information on the working of the mine during the period of Watson ownership (1708-1887). An investigation through census data on the number of foundries in the vicinity of South Kingstown might shed light on the market for graphite during this period. A search of South Kingstown tax data or Town Council records might turn up evidence of a small graphite operation subsidiary to the farm. The Brown family papers at the John Carter Brown Library contain extensive records of the Brown family's Hope Furnace in Scituate. Research in these papers may provide evidence the purchase of foundry facing material from Coojoot.
2. If Charles T. Jackson's 1839-40 field notes survive, they may contain more background on the "thirty tons" of graphite he described in his state report. Dr. Patrick Malone of Brown University has suggested the following avenues for a search for Jackson's notes: the Arnold Arboretum, the Gray Herbarium, the Massachusetts Horticulture Society, and the Museum of Science (former Boston Society of Natural History). He also suggested contacting Professor Hunter Dupree, who can be reached through the Gray Herbarium at Harvard.
3. A more focused search at the R.I. Judicial Archives may turn up more details of the May 1895 legal settlement between Emma Carver and J. Mason Gross mentioned in Gross's journal of that year.
4. Paul Gleeson, Jr., the son of the author of the 1939 RIHS Coojoot article, lives in Coventry, RI. Gleeson Sr.'s wife also resides there and described several boxes of her husband's papers in the basement of the house. These boxes may contain the letter Thomas G. Hazard wrote to Gleeson in November 1938 describing the physical setting at the mine when he bought the property in 1908.
5. Microfilm research in the weekly *Narragansett Times* local news column conducted for this report covered the following periods: February 1894 to May 1896 and March 1900 to Jan 1901. Research for May 1896 to March 1900 and January 1901 to December 1903 may turn up more details related to the mine. Because the ACGC operation appears to have ceased in 1903, there may be articles about the disposition of equipment after the failure through public auction or sale. Some further research following the lead of a 11/2/1900 *Times* item on the opening of a mine at the Jeremiah Potter property just north of Coojoot may contribute to the local context.
6. J. Mason Gross in his journal entry of June 16, 1894 describes being contacted by the *Providence Evening Telegram* with regard to an article about the New England Mining Company. He declined to offer any information at the time and noted the following day (Sunday June 17) that an article had run anyway. A search of the *Evening Telegram* failed to turn up this article. There is no Sunday edition of the *Telegram* on microfilm and it is possible that Gross made an error and meant the *Evening Bulletin* or the *Sunday Journal*. If such an article exists, it could flesh out our understanding of the early Gross operation at Coojoot. Another entry dated February 11, 1896 describes a call from a "mining paper in the west" for information on the New England Mining Company. A search of mining journals of the period might turn up this article. If this second article exists, however, it would not be likely to reveal much about Coojoot because

of its late date. The Brown University Science Library has the Engineering Index for 1896. Although a general search from 1882 to 1900 has been carried out, a more detailed search through 1896 and 1897 might turn up this article.

7. Elsewhere in his journal, Gross makes mention of insurance and the name “Phenix.” A search of insurance records such as the fire insurance records at RIHS Manuscripts Division may offer either a narrative description or visual record of the site.

Archaeological and physical investigation

1. Dr. Don Hermes of URI has suggested that an analysis of the length and dimensions of the berm and other waste rock deposits could be used as a means of calculating the productive yield of the mine. Little is known of the actual amount of graphite removed from the mine over centuries of use.

2. The 1895 South Kingstown map shows three buildings at the Carver Lead Mine. One of them appears to be accounted for in the ruins west of the north pit. The other two buildings are situated on either side of the right of way and closer to Middle Bridge Road. Foundation ruins and a small well have been located on the north side of the stone wall marking the right of way and southeast of the north pit (see map). The 1900 ACGC contract describes three buildings at the site: the factory building, the barn and the dwelling. Some clearing and investigation of this area may determine this to be either the Watson farmhouse or barn site, which may yield artifacts from the Watson period as well as the New England Mining and ACGC periods. Because the present day right-of-way appears to have been in use for over 200 years, archaeological investigations along the roadway may turn up agricultural, mining, and household artifacts. Investigations in the woods south of the right of way above the berm may reveal the foundations of the third and southernmost building shown on the 1895 map.

3. Sheldon Pratt of the Narrow River Land Trust has spoken of other foundations located in the heavy growth between the substantial foundation remains at the top of the ridge and the north pit. A partial clearing of this area could reveal evidence of the means of extraction or other mechanical evidence.

4. Although the mention of a 400’ shaft in Philip Morrill’s 1969 survey of the state’s mines is not corroborated by any other documentary evidence, this and anecdotal sources suggest that there may be a shaft or shafts no longer visible or accessible. An investigation into the possible use of ground penetrating radar to locate such voids may be worthwhile. Mike Winter (phone conversation 8/13/2003) spoke of a deep shaft opening from the north pit, now covered. A visit to the site with Winter would likely provide important background as to recent changes on the land.

5. There is no evidence yet of a public auction of mining equipment left behind by ACGC after 1903. Because of this, there is a possibility that some mining or processing equipment was left behind. Once the foundation of the 30’ x 80’ processing building is confirmed, investigation in the vicinity may reveal buried machinery or other industrial artifacts related to the activity from 1894 to 1903.

6. An analysis of the small-sized waste rock or tailings at the east wall of the north pit may provide information on types of processing of crude graphite at the mine. Clearing in the areas of the pits and berm may also provide information on processing.

7. As of yet no evidence of steel rail appears to have been found along the berm. Investigation in this area could reveal how the crude graphite was transported during the period from 1894 to 1903. Metal detection may be helpful.

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Book 35, Page 68: Contract between E. B. Carver and American-Ceylon Graphite Co.

Book 37, Page 128: Will of E. B. Carver

Notes

¹ Although there is speculation that English monks marked their sheep with raw graphite, the use of graphite in the “lead” pencil dates to the 16th century when a huge graphite deposit was discovered in Borrowdale, England. The unprocessed graphite was sawn into sheets and cut into square-section rods. These rods were then inserted into hand-carved wooden holders. The modern method of kiln-firing powdered graphite mixed with clay dates to an invention by Nicholas Jacques Conte, an officer in Napoleon’s army. It was soon discovered that varying the proportion of clay to graphite rendered pencils of varying hardness.

² See R. Palmer, “A Graphite Mine.” *Engineering and Mining Journal*, 9 December 1899, p. 694

³ Rider, *Sachems*, p. 141

⁴ Roger Williams, *A Key into the Language of America*. 1936 reprint. p. 192.

⁵ Gleeson, *Coojoot*, p. 3-4

⁶ See Turnbaugh, *The Material Culture of RI 1000*, p. 17. Figure 4. This artifact was found at RIHPHC Archaeological Site RI 1000, located in North Kingstown. Native American graphite artifacts were also found in gravesites at West Ferry (Jamestown), Whitford (North Kingstown), and Burr’s Hill (Warren).

⁷ See Ed Hood and Donald Weinhardt. “Frederick Tudor and the Sturbridge Graphite Mine.” *Old Sturbridge Visitor*, Fall 1998, pp. 4-5

⁸ Brenda Elliott, *The Best of Its Kind*, p. 117

⁹ Elliott cites two sources for this description: Frederick Webb Hodge, ed., *Handbook of American Indians North of Mexico*; Bureau of American Ethnology Bulletin 30, 1906 (New York: Rowman and Littlefield, 1971), 13, 921-5; John R. Swanton, *The Indians of the Southeastern United States* (Washington, DC: Smithsonian Institution Press, 1979), 532-6.

¹⁰ It has been suggested that Hull was more interested in the possibility of finding silver or gold at the site, rather than mining the graphite.

¹¹ For a discussion of the Borrowdale Mine and the historical uses of graphite in England, see <http://www.lakestay.co.uk/wad.htm>

¹² Quoted in Frank Gleeson, *Coojoot*, 1939, Original is found *Massachusetts Historical Society Collection*, Fifth Series. Vol. VIII, pp. 49-50

¹³ The original fragment is found at the URI Library.

¹⁴ Miller, *Ancient Roads*, p. 108

¹⁵ *ibid* 110

¹⁶ Additional study of South Kingstown tax records for the period of Watson ownership could establish the existence of a small-scale mining operation separate from the farm itself.

¹⁷ Charles T. Jackson, *Report on the Geological and Agricultural Survey of the State of Rhode Island*, 1840

¹⁸ This company also conducted business under the name of Gross and Brown.

¹⁹ Rhode Island General Assembly records show a state chartered corporation of the same name formed in August of 1880. While the title of the charter summary gives the name “New England Mining Company,” the text of the General Assembly act reads “New England Mining and Land Company.” There is no apparent connection between this company and the one operated by J. Mason Gross twelve years later.

²⁰ An article in the August 1, 1891 edition of *Engineering and Mining Journal* noted that “Within the last year the price of plumbago delivered in New York has advanced nearly 60% due primarily to two causes—the quantity mined has fallen off, and the demand, especially outside the United States has increased.” This increase in demand and price was attributed to a growing international need for graphite lining for crucibles used in steel manufacture. (p. 121)

²¹ *Narragansett Times*, 6 July 1894, p. 1

²² Gross journal entries, July 19 and addendum in “Cash Accounts” section in back pages of journal

²³ Local news item, *Narragansett Times*, 14 Sept. 1894, p. 1. The reference to Angell and Company is likely an error. A. J. Angell was a Gross business associate overseeing the mining operation at Coojoot.

²⁴ Local news items, *Narragansett Times* 5 October 1894, p. 1 and 12 October 1894, p. 1

²⁵ There is no separate tax listing for any real or personal property for Angell and Company for these years. During the American-Ceylon Graphite Company's franchise, however, separate listings appear for Mrs. Carver's real property and American-Ceylon's personal property at the mine. ACGC's personal valuation of \$2,000 remained the same for the years 1901-03.

²⁶ The list was partially annotated as to cost. Next to the pump was the figure "40.00" and next to the crusher, "300."

²⁷ *Engineering and Mining Journal*, 11 December 1897, p. 708. Two years later this same journal published a more thorough article on the Cranston mine. By 1899 the mine was powered by a 50 HP steam engine and an 80 HP boiler. At the time of the article, the company was able to mine 15 tons per day.

²⁸ Quoted in Shaler et al, *Geology of the Narragansett Basin*, 1899

²⁹ Journal entries, October 5 and November 1, 1894

³⁰ B.N. Lapham of Providence

³¹ A search of indexes for the period at the Rhode Island Judicial Archives yielded no case with a plaintiff or defendant named Emma Carver, J. Mason Gross, or New England Mining Company.

³² "Rhode Island Graphite Company." *Providence Journal of Commerce* 5, August 1897, p. 230

³³ Shortly after Carver entered into this agreement, the *Narragansett Times* (local news item, November 2, 1900, p. 1) noted that "The Lead Mine company have begun digging for lead on the land recently purchased of Jeremiah at Tower Hill." The Potter land was to the immediate north of Carver's land.

³⁴ South Kingstown Land Evidence Book 35, page 68.

³⁵ *ibid*

³⁶ It should be noted that the entire U.S. production of amorphous graphite for 1897 was around 500 tons.

³⁷ South Kingston Land Evidence book 35, p. 68

³⁸ Gleeson, a Brown graduate, taught at Classical High and Brown University. The reason for his interest in Coojoot is unknown.

³⁹ Paul F. Gleeson, "Coojoot," pp. 6-7. It should be noted that Hazard, Gleeson, or both were apparently unaware that two separate companies worked the mine between 1894 and 1903. As a result, improvements attributed in Gleeson's article to the period of the ACGC franchise may be improvements actually made by New England Mining Company.

⁴⁰ Source: Philip Morrill and Willard S. Winslow, *Rhode Island Rocks and Minerals*, p. 18

⁴¹ *Providence Sunday Journal*, 7 June 1908, Section 4, p. 4

⁴² There is no indication on this map of the location of the former Watson farmhouse and family cemetery. The farmhouse and barn may be two of the buildings shown.

⁴³ Rhode Island Bureau of Industrial Statistics *Annual Report*, Bulletin No. 1: Preliminary Report of the Natural Resources Survey of Rhode Island

⁴⁴ Source: George Ashley, *Rhode Island Coal*, p. 5

⁴⁵ Source: Miller and Hermes, 1971. In describing the dividing line between graphite and anthracite coal, Harry Chase in his 1987, *Graphitic Coal Mines in Rhode Island and Massachusetts*, paraphrased an earlier observation by Rhode Island geologist Alonzo Quinn: "The dividing line at which 'anthracite coal' left off and 'graphite' began was not a firm one, and seems to have been defined by empirical decision. Did the stuff burn?—then it was sold as fuel. If it wouldn't burn, somebody would buy it for graphite." p. 3

⁴⁶ The Narragansett Basin is an area that extends about 55 miles from Narragansett Bay to its northeast extremity in Hanover, Massachusetts. From 15-25 miles wide, its western margin is in the western part of Providence; its eastern margin passes through Fall River, Massachusetts. The greater part of the basin is in Massachusetts. Older rock formations on Aquidneck Island and Jamestown suggest that the southern margin of the basin runs in that vicinity. The basin is underlain by a Pennsylvanian-era (about 300 million- year-old) formation called the Rhode Island Formation, which includes conglomerate, sandstone, greywacke, arkose, shale, and some graphitic coal (also referred to as meta-anthracite). Source: Alonzo Quinn, *The Bedrock Geology of Rhode Island*, 1971.

⁴⁷ See Harry Chase, *Graphitic Coal Mines in Rhode Island and Massachusetts*, p. 3



