

Mining History of Ruggles mine, Grafton, New Hampshire

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Introduction

This article explores the history of mining at Ruggles mine in Grafton, New Hampshire, with a view towards how it became the large, open pit we see today. An obvious way to observe the progression of mining would be to examine maps covering decades. Previously, only three sets of detailed mining maps could be found from 1923 to 1944: Sterrett (1923), Bannerman (1943) [maps surveyed 1941] and Cameron et al. (1954) [maps surveyed 1944]. The changes to the mine from 1923 to the 1940s were substantial; in Sterrett's time, there were no open pits at the top of the hill. Maps from the 1930s could provide an important connection between Sterrett and Bannerman. In 2012, the author became aware of a 1930s geological survey by Dr. Benjamin M. Shaub (Smith College, Northampton, MA) from a copy of a letter obtained from the Smith College Archives (Verplanck 1938), but a copy of the survey or maps could not be found at that time.

Recently, the author examined the contents of a box of documents related to Ruggles mine from a private collection. In this box were several maps drawn by Dr. Benjamin M. Shaub from his survey of Ruggles mine conducted in July 1938. Shaub was hired by Philip B. Verplanck, Vice President of the Mining Division of Whitehall Company (NY) with an office in Gilsun, New Hampshire from 1932 to 1957 (Verplanck 1938; MEH, 1974 Jan 8). The Shaub maps include a detailed plan view (the original is about 72 by 31 inches, and the elevation contours are in 5-foot increments), a longitudinal vertical section, and three vertical cross section views. These Shaub maps have never been previously published, and are presented here with permission of the owner. Note that Bannerman (1943) acknowledges that he was given access by Whitehall Company to Shaub's survey and maps.

Since the group of Ruggles mine survey maps discussed in this article include some that are rare and/or hard to find, all have been reproduced here in Figures 2 through 14 and grouped chronologically for quick reference and easier review.

Comparison of Map Nomenclature

Sterrett, Shaub, Bannerman and Cameron did not always use consistent nomenclature for the mine features on their maps, and those features changed from year to year. Some features merged while new ones appeared. Thus, it is necessary to provide an overview of the similarities and differences in the terminology to clarify further discussion. This is summarized in Table 1. Since there was no mining at the top of Isinglass Mountain in 1923, Sterrett's entries

for those areas are blank. As a reference to the physical locations of the labeled features, a Lidar view of the entire mine is shown in Figure 1 below.

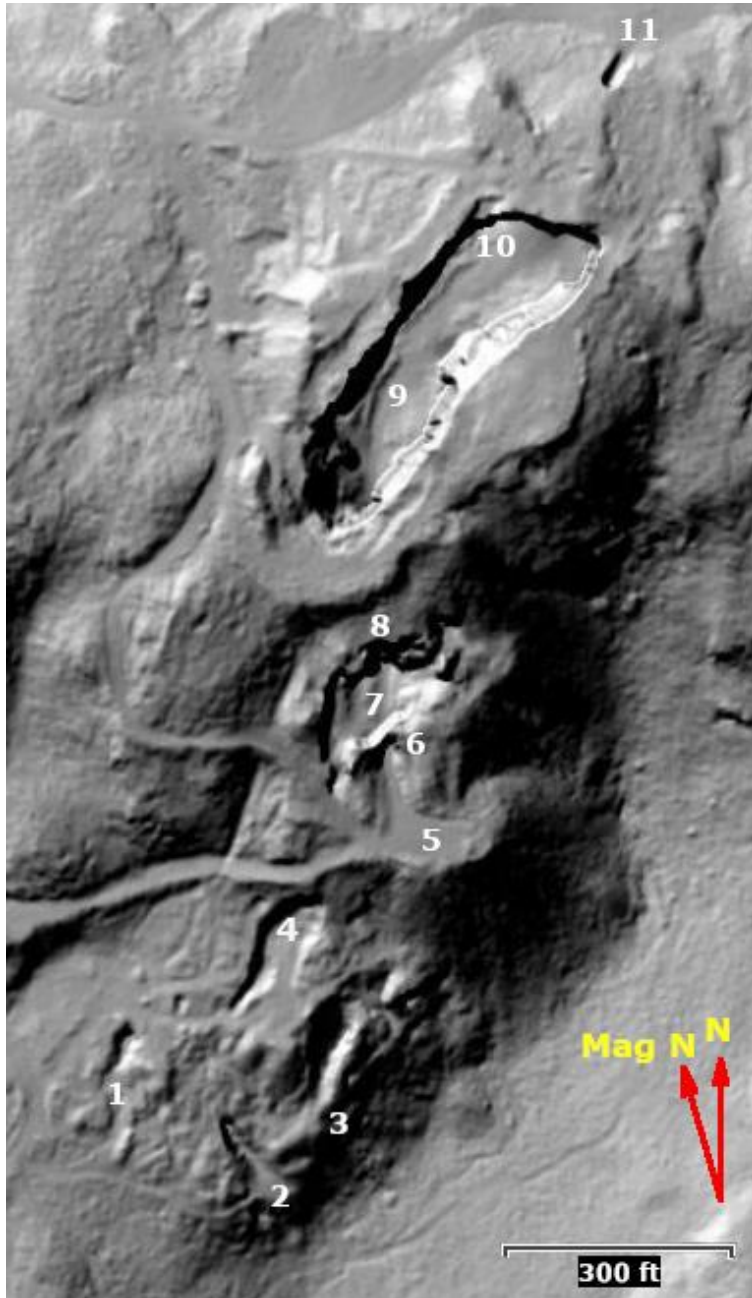


Figure 1. Lidar view highlighting Ruggles mine features. From south to north:

- 1) Small, water-filled cut.
- 2), 3) Old open cuts.
- 4) Open cut, stopes.
- 5) 'Modern' overlook.
- 6) Stone arch.
- 7) Back-filled pit 32.
- 8) SW tunnel exit from open pit.
- 9) Large open pit.
- 10) Pit entrance from NE tunnel to parking lot.
- 11) Open cut at NE tunnel entrance from parking lot.

Adapted from NH Stone Wall Mapper [NHSWM].

Geological Surveys											
Author (Year)	Sterrett (1923)			Shaub (1938)		Bannerman (1943)	Cameron (1954)		Lidar		
Originally Published as	Figure 35	Figure 36	Figure 37	Plan View	Longitudinal View	Plate 1	Plate 33	Plate 34	NA		
This Study	Figure 2	Figure 3	Figure 4	Figure 5a	Figure 5b	Figure 10	Figure 12	Figure 13	Figure 1		
	Dumps and old quarry workings				[unlabeled cut]	Cut	Southwest Cut		1		
	Dumps and old quarry workings				Old cut filled with waste	Open Cut	South Prospect Drift		2		
	Dumps and old quarry workings				[unlabeled cut]	Open Cut	Southeast Cuts		3		
	Lower Workings		Lower Workings, Open Cut, Raised Slope		Open Cut, Slope No. 1	Cut, Slope	Slope No. 1		4		
					Pit D [2 pits]	Pit 2	Pit 32		7		
	Upper Workings				Slope #2	Slope	140-Foot Level, Flat Slope	140-Foot Level	8 & part of 9		
					Slope #3			120-Foot Level	5 part of 9		
				[unlabeled shaft]	[unlabeled shaft]	Winze	South Shaft		5 part of 9		
				Pit B		[S part of Pit #1]	[S part of Pit A]	Pit A	5 part of 9		
				Pit A		[part of Pit #1]	[part of Pit A]		5 part of 9		
				Pit C		[NE corner Pit #1]	Pit C	Pit C	mid-9		
						Winze	North Shaft		mid-9		
						[not labeled]	Pit D	Pit D	10		
				[unlabeled cut]		Cut	North Prospect Drift		11		

Table 1. Variations in nomenclature between surveys. Follow across each row to determine how a particular structure was called in each survey. Blank entry indicates no mention in the selected Figure. Refer to Figure 1 for the physical location using Lidar location numbers.

19th Century Mining

Few documented records are found concerning mining at Ruggles in the early 19th Century. Almost every mention of Sam Ruggles opening his mine in Grafton uses the year 1803, but no evidence to support that date can be found. It is reliably documented that Sam Ruggles first purchased property on Isinglass Hill in Grafton, N.H., on 5 July 1805, and additional purchases were made on adjacent tracts in 1806 and 1810 (GCRD 1805, 1806, 1810a, -b, -c). Two of Sam Ruggles' sons, George and Charles, joined their father in his mica business. George purchased the mica company from his father in 1834 [GCRD 1834] and continued the business after Sam's death in 1843. Following George Ruggles' death (without a will) in 1865, the mine was managed for 16 years by Sam Ruggles' nephew, Joseph D. Gould, as trustee of George Ruggles' estate. Following Gould's death in 1879, two of Sam Ruggles' grandsons, George H. and Charles L. Randall took over the mica business and continued until around 1896. These family histories are covered extensively in Davis (2019).

Charles T. Jackson (1844:115) gives a general description of the mine location in Grafton with the quarry "on the southeast side of the hill." Jackson's text was written when George Ruggles oversaw the Ruggles mica business, and around the time of Sam Ruggles' death in 1843. Unfortunately, Jackson provided no maps. Note that the body of Jackson's text mistakenly uses the name "Ingalls" instead of Ruggles, but a correction is given in the errata list at the back of the book on page 376 where it has often been overlooked (e.g., Cameron et al. 1954:235). Hitchcock et al. (1878:90) describe the general location of Ruggles mine, but their focus is on mine production and sales; no maps are shown. When Hitchcock's book was published, Sam Ruggles' grandsons George H. and Charles L. Randall had taken over the Ruggles mica business. Sterrett (1923:139) states that "[t]he early workings consisted entirely of open quarries in the steep slope." Sterrett [Figure 2] shows upper and lower workings, and old quarry workings buried under dumps. This fits nicely with Shaub's 1938 Plan View [Figure 5b] that shows "Old [open] cuts filled with waste," and similarly Cameron et al. (1954) "southeast cuts" [Figure 12]. In 1944, these open cuts were only partially covered by rubble. *These old, open cuts are likely the earliest mine workings by Samuel and George H. Ruggles and fits well with the earliest description of Ruggles mine in Jackson (1841, 1844).* But when the 'overlook' area was constructed at the southern-most corner of the mine, probably in the 1960s, it's possible that some of the earliest workings could have been hidden by significant quantities of rubble as seen in the Lidar view of the area [Figures 1 & 22].

Sterrett's "lower workings" [Figure 4] also includes an open cut and stope driven back into the hill with a room about 25 feet high, and a raised stope branching off to the right (Sterrett 1923:140). This appears to be the work of George Randall as manager of the mine in the 1880s and 1890s (he is also, as Sam Ruggles' grandson, the first and only member of the Ruggles family to actually live in Grafton as a resident). It is also identified on Shaub [Figure 5b

and Figure 6] as Stope No. 1 and Open Cut. It shows on Bannerman [Figure 10] as Cut and Stope, and on Cameron et al. (1954) as Stope No. 1 [Figure 12]. This area was off limits to visitors of Ruggles mine between 1963 and 2016, but recently the author was able to access, explore and photograph this area. The open cut, stope, 25-foot high room and raised stope still appear as described by Sterrett (1923:140). Figure 18 is a photo of the open cut, and Figure 19 is a cart rail found adjacent to the open cut, as mentioned by Charles Randall in his presentation to the 1890 Senate hearing (USSN 1890). Figure 20 is a view of the Stope #1 entrance seen in Sterrett's Figure 37 [here Figure 4], and view looking out from Stope #1 [Figure 21].

Cameron et al. (1954:236) mentions that “[t]he earliest work was done near the bottom of the slope. In general, each succeeding operation was opened at a slightly higher elevation, and the waste rock was dumped into the earlier cuts.” This is certainly evident, particularly in Shaub (1938) Longitudinal Section View [Figure 6]. Rubble from Stope #2 dumps into the open cut outside its entrance. Rubble from Pit #32 above Stope #1 fills the vertical shaft into the upper end of Stope #1. Figure 6 is the only survey map that shows this back-filled shaft down into Stope #1, critically important safety information for anyone who desires to clear the rubble from the end of Stope #1. Cameron et al. (1954:236) comments that Stope #1 is one of the oldest underground workings and leads back to a back-filled shaft (not shown on their maps).

Between 1878 and 1888, we know oxen were used at the mine, since George H. Randall was sued in Canaan, N.H., for the treatment of his oxen. The New Hampshire Society for the Prevention of Cruelty to Animals recommended that the judge visit the mine to view the animals' condition for himself. Randall was judged guilty and paid a fine that included the cost of the prosecution. He appealed, but the outcome is not known (Boston Evening Journal, 1888 Mar 12).

On 2 September 1890, Charles L. Randall, then President of the Ruggles and Randall Mica Company of Grafton, New Hampshire, presented a statement to the United States Senate in Washington, D.C., concerning the domestic mica industry and the need for protective tariffs on imported mica (USSN 1890:1-3). George and Charles Randall had been managing and operating Ruggles mine since about 1878. In his presentation, Charles Randall gave statements about the investments made in mining equipment and machinery at their mine in Grafton, N.H. He stated that they “... expended over \$120,000 [over \$3-million today] in driving two tunnels several hundred feet under a mountain, built engine houses, placed two 50-horsepower boilers, hoisting drum, steam drills, large workshops, ... [mine] car-tracks, and also built roads”

20th Century Mining

In the early 1900s, Sam Ruggles' great-grandson, Charles Ruggles Tainter¹, was the last member of the Ruggles family to work the mine (Carroll & Cooper 1900:38).

Cameron et al. (1954:235) credits Sterrett (1923:143) with the statement that mineral rights to Ruggles mine were owned by Joseph Rogers of Rumney Depot, New Hampshire. However, no such statement in Sterrett (1923) could be found, and no supporting documentation could be found in the Grafton County Register of Deeds².

Sterrett (1923:143) reports that "Since 1912 a part of the dumps have been worked over by a crew of several men." Cameron et al. (1954:235) report further details, stating that around 1912, American Minerals Company was preparing to work Ruggles for feldspar, and "at that time" the English Mica Company³ had begun working the dumps for scrap mica (implying a date of 1912). Cameron et al. also discuss crushing rock on the dumps and washing it down a 3,200-foot flume to a mill on Manfeltree Brook at the bottom of the hill. These statements are repeated in Cushing (1992). However, the Grafton County Register of Deeds has no record of "American Minerals Company." Perhaps there was some confusion about the company name. American Mica Company was founded in 1892 by George B. Watson. His business partner was Frederick W. Webster who continued operating American Mica Company after Watson left in 1908. Watson, Webster and their company *do* appear in the Grafton County Register of Deeds, for example in 1911 when Webster, and therefore American Mica Company, gained access to Ruggles mine (GCRD 1911b, -c).

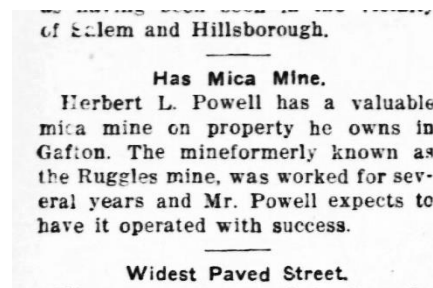
English Mica Company doesn't appear in official records around 1912 as suggested by Cameron et al. (1954) and Cushing (1992) but can be found instead in 1931 (GCRD 1931a, -b). It's difficult to imagine how you could operate a hydraulic flume transport without a source of running water (a feature not currently seen) of sufficient volume to wash rocks down a 3,200-foot flume daily. Additionally, Frost (1934) states that English Mica Company didn't begin work until 1929 and were unsuccessful. (How does an unsuccessful venture support the construction and operation of a 3,200-foot flume and mill?)

¹ Charles Ruggles Tainter (1868-1942) was the son of Elisha Edwin Tainter (1845-1936) and Julia E. Ruggles (1842-1920), daughter of Charles Ruggles (1809-1869), son of Samuel Ruggles (1770-1843).

² No entry for "Joseph Rogers" could be found in the Register of Deeds prior to 21 July 1972.

³ English Mica Company, founded by Thomas English in Spruce Pine, N.C. in 1908. In 1931, their address was in Manhattan, New York City, N.Y.

A curious news item in a 1921 New Hampshire newspaper, the Groton Times, announced that Herbert L. Powell owned Ruggles mica mine in Grafton (Groton Times, 1921 Nov 4). This is the only mention that could be found, e.g., no record in the Grafton County Register of Deeds, Cameron et al. (1954) or other references.



Cameron et al. (1954:235) state that the Whitehall Company worked the mine for a short time in 1932, and continuously since 1936. Cameron et al. (1954:236) also stated that Phillip King Brown was manager of Ruggles mine. He worked in this position for 25 years from 1932 to 1957 (MUL, 1993 Dec 2). According to Cameron et al., beginning in 1932, Whitehall Co. worked Stope #2, also identified as the 140-foot level, which was driven northward for feldspar. They also provide many details about the expansion of the underground workings, discussing extensions, directions, lengths, and crosscuts. But many of these workings were later swallowed by the expansion of the open pits working down from above. Only a few tunnel segments remain visible today: fragments of the 120-foot level tunnel can be seen on the western side of the open pit towards the southwestern end, and the entrance to the 140-foot level tunnel is now the exit tunnel at the southwestern end. The winzes and shafts of Bannerman and Cameron et al. are gone now, erased by the big open pit.

A fascinating description of a powered drum winch and its operation in the early 1930s was discovered in a collection of documents held in a private collection. One document states, in part:

“The Winch was built locally by cutting the front from a Chevrolet Automobile and adapting a Commercial Drum Winch and Controls. The Engine (a 1928 Chevrolet 4-Cylinder) is all original (except for a 1932 Coil and Distributor) with the 6-Volt Automobile Battery relocated to the front of the Machine. The Chevrolet Engine was preferred to the Ford Model T (and the later Model A) of this period because of the proven durability as a Stationary Power Unit. [...] The operation of this Powered Winch was a noisy, smelly and arm numbing experience from exhaust noise and gas, control forces and vibration ---- but it saved a lot of hard work, inexpensively.”

Open pits at the top of the hill were mapped by Shaub in 1938 [Pits A, B and C in Figure 5a]. According to Frost (1934:42), an open pit was begun by Whitehall in November 1932 that, by 1934, was 50 feet by 75 feet. This describes quite well the southwestern, larger end of Pit A as shown on Shaub’s 1938 map [Figure 5a]. Four years after Frost’s description, Shaub shows Pit A extended northeasterly another 51 feet by 61 feet wide. Pit B, just southwest of Pit A,

looks somewhat like the profile of a whale where it followed the pegmatite, while Pit C was just a 36 by 37-foot hole, expanding somewhat below the surface.

By 1941, Pit A had expanded into and fully engulfed Pit B, shown as “Pit #1” in Bannerman (1943) [Figure 10] compared to Shaub (1938) [Figure 5a]. Also, the northeast end of Pit #1 (labeled “Pit C” on Shaub) was partially separated from Pit #1 by a wall as shown in the Section B-B' view of Bannerman [Figure 11]. The wall was still there between Pit A and Pit C in 1944 as shown on Cameron’s maps [Figure 12] and Section A-A' [Figure 14].

In his 1965 memoir “50 Years of Collecting” in *Rocks and Minerals* magazine, Gunnar Bjareby describes his personal experiences collecting at Ruggles mine between 1938 and 1942 (Bjareby 1965). His description of the workings and pits aligns well with the maps by Shaub, and his collecting experiences bring goosebumps to most any collector of radioactive minerals (like this author). The location Bjareby describes for the classic Ruggles uranium minerals also agrees quite well with Page (1950:27). Evidence for uranium species is also apparent in a side gallery along the east wall in the southwest corner [Figure 24] at a position related to the description in Page (1950:27). The entrance to this gallery is visible in Figure 25, an uncommon view of the open pit from the rim above the southwest exit tunnel looking northeast towards the entrance tunnel from the parking lot. The discovery of radioactive minerals at Ruggles mine is discussed in detail in Davis (2021).

Shaub’s Stope #2 [Figure 5b] is a match for Sterrett’s Upper Workings [Figure 3]. Note that the two tunnel entrances in Sterrett [Figure 3] look exactly like the tunnel entrances shown in an old Post Card image [Figure 23], another interesting view of Ruggles mine. The length of Shaub’s Stope #2 in 1938 was driven about 21 feet further than Sterrett’s map in 1923, but the maximum overall width in 1938 was about doubled at 108 feet. Cameron’s 1944 map “Geologic Plan of 140-foot Level” [Figure 13] shows Stope #2 driven well over 400 feet to the northeast, especially along the western wall.

Cameron et al. (1954) state that in 1940, Whitehall Company drilled four exploratory diamond drill cores that were examined by USGS. Core samples were found by the author, but they were scattered about, unorganized (not to mention dispersed by vandals), and separated from any labels. Six Diamond Drill Hole (DDH) maps and five core logs were found in a private collection that identify DDH numbers up to sixteen locations (some locations with up to three holes, e.g., 16A, 16B and 16C), far more than the four holes mentioned by Cameron et al. who credit Whitehall for the drilling and the data. These maps bear many similarities to those by Page, Main and Ellingwood found in Cameron et al. (1954); these DDH maps were not published. Most of the DDH maps and core logs found in the private collection are undated and unsigned except for three core logs; they show the initials “P. K. B. Jr.,” one is dated 5 September 1946, and the other two show only “6/24” (24 June 1946?). Phillip King Brown was

manager of Ruggles mine for Whitehall company from 1932 to 1957. However, he is not a “junior”, but his son was. Phillip King Brown, Jr. was born 6 May 1928. In 1946, P. K. B. Jr. was between high school and college. Perhaps he had a summer job working for his father at Ruggles mine?

According to Cameron et al. (1954:235-236), New Hampshire United Mining Company (NHUMC) of Andover, N.H., worked Pit 32 [Figure 12, Figure 14 “Section A-A”] under lease during August and September of 1944. The pit itself, however, was already mapped on Shaub (1938) [Figure 5b, as “Pit D”] and Bannerman (1943) [Figure 10, as “Pit #2”]. This arrangement must have been between Whitehall Company and NHUMC, since NHUMC could not be found in Grafton County Register of Deeds. By the early 1960s, Pit 32 had been back-filled and was located between the two tunnel exits and the stone arch [Figure 1, location 7].

Bannerman (1943) [Figure 10] shows a “Mill” just west of the mine at the northwestern end. Cameron et al. (1954) [Figure 12] also shows a larger, unlabeled facility at the same location. Today, no building stands there, but there are some concrete structures still standing [Figure 26]. They could either support a heavier structure or were possibly walls of sorting bins near the mill. Whitehall Company built another facility to sort, store and ship Grade 1 and Grade 2 feldspar at the foot of the mountain. The box of documents in a private collection included two drawings prepared for Whitehall Company dated 8 December 1947. The detailed plans show five buildings: a power plant, raw material storage, a sorting plant with a “muck conveyor” and two conveyors going to two storage bins for graded feldspar placed alongside a railroad side spur connected to a Boston and Maine railroad that ran through Grafton Center.

In 1959, the division of Whitehall Company managing Ruggles mine changed its name to Bon Ami Mining Company, Inc. (GCRD 1959a). The same day, Bon Ami Mining Company issued a Warranty Deed to New England Industrial Properties (NEIP) of Danielson, Connecticut for Ruggles mine and a Kilton property (GCRD 1959b). Whitehall Company had ceased their mining operations at Ruggles mine.

In 1960, NEIP issued a Warranty Deed to Arvid Sven Wahlstrom⁴ of Plymouth, Grafton County, New Hampshire for Ruggles mine, the Armstrong tract and the Kilton tract (GCRD 1960a). According to John Lippman (writer for Valley News), Arvid and Geraldine “Gerry” Wahlstrom paid \$20,000 for the properties (Valley News, 2021 Feb 28). Within a few weeks, Arvid Wahlstrom formed Ruggles Mining Company, Inc. in which he was President and his wife, Geraldine E. Wahlstrom, was Treasurer (GCRD 1960b). Two days later, Wahlstrom leased all the mineral rights for Ruggles mine, Armstrong tract and Kilton tract to Ruggles Mining Company,

⁴ Arvid Sven Wahlstrom (1919-1989), born Sven Arvid Wahlstrom in Boston, MA (ELCA 1919, USFC 1920 & 1930, Valley News 1989a).

Inc. for a period of 10 years (GCRD 1960b). It also established a payment schedule of \$40 per ton of sheet mica, \$50 per ton for beryl and \$0.40 per ton for feldspar that is mined and sold by Ruggles Mining Company. This allowed Wahlstrom to receive income, royalties etc. from the operation of Ruggles mine and other properties worked by Ruggles Mining Company, Inc.

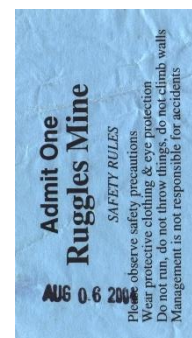
On June 12, 1961, Golding-Keene Company signed a lease with Ruggles Mining Company for access to Ruggles mine and other properties for five years to mine and remove feldspar (GCRD 1961a). The lease was terminated by Wahlstrom on 8 April 1962, about four years short of the original terms in the lease (GCRD 1962). Golding-Keene got almost a year to mine & remove feldspar from Ruggles mine. Wahlstrom purchased the assets and liabilities of White Mountain Minerals Company (Warren, NH) in 1961 to crush & process waste mica from Ruggles (GCRD 1961b). He was clearly interested in commercially working Ruggles as a mica and beryl mine, the two most valuable commodities on the market at that time (feldspar was only 1/100th the value per ton of mica and beryl: GCRD 1961a).

Wahlstrom clearly intended to take advantage of the U.S. government's stockpile program that purchased mica and beryl. But in 1962, the government ended stockpiling mica and beryl. New Hampshire miners and mine owners were very vocal about the effects of that decision. In consultation with his father-in-law John Deal, Wahlstrom decided to open Ruggles mine to collectors as a fee-based tourist attraction.

End of Commercial Mining, Beginning of Tourist Attraction

Although the appearance of the mine itself changed little with the transition to a tourist attraction (aside from the occasional dynamite detonations to expose fresh material; Robert Whitmore, pers. comm. 2019), the history of its evolution is not well known.

In 1962, Ruggles mine opened to collectors (e.g., Nashua Telegraph, 1962 Jul 23; Boston Globe, 1962 Jul 31; Boston Herald, 1962 Jul 29). Admission in 1962 was only \$1.10 for adults, \$0.50 for children 12 to 18 years old (Nashua Telegraph, 1962 Jul 23); in 1988, \$5.50 adults, \$2.50 children 6 to 11 (Valley News, 1988 Aug 3); 2004: Adults \$17.00 (personal visit); 2011 - 2016: Adults \$25.00 (personal visits). Newspapers ran articles about the mine with glowing headlines like: "Tenderfoot Prospectors Stage Own 'Gold Rush'" (Boston Globe, 1962 Jul 31), "Rockhounds Find 'Gold' Adventures in NH Hills" (NH Sunday News, 1965 Apr 4), "Rockhounds Canvas Ruggles Mine" (Boston Globe, 1965 May 16), "Grafton's Ruggles Mine is Goal for Enthusiastic Rock-Hounds" (MUL, 1965 Jun 25), and "Gems to Fall From the Sky!" (Boston Herald, 1972 Sep 6).



In 1963, Wahlstrom was looking for investments from New Hampshire Industrial Park Authority to help fund the formation of a tourist attraction but was rejected (MUL, 1963a Jun

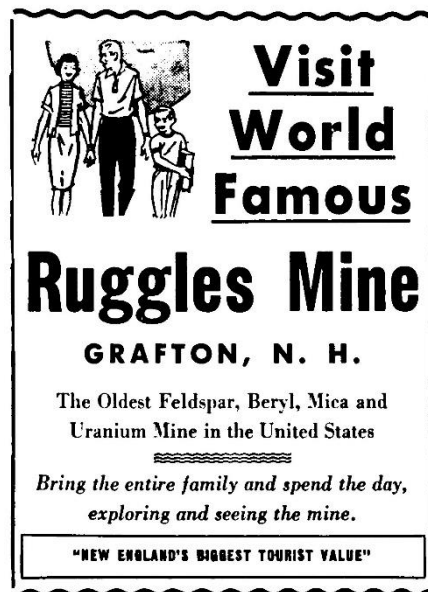
2). He was very critical of a 1963 U.S. deal with Brazil to swap U.S. wheat for Brazilian mica & beryl instead of supporting domestic mines and miners (MUL, 1963b Jun 16).

An article in the Manchester Union Leader titled “How SBA Makes Disaster Loans” used Ruggles mine as an example (MUL, 1973 Sep 13). The summer of 1973 had so much rain that it almost ruined Arvid Wahlstrom’s main source of income – Ruggles mine. The rain seriously damaged the road up Isinglass Mountain to the mine, with washouts reportedly up to six feet deep and fifty yards long.

Arvid S. Wahlstrom and Geraldine E. (Deal) Wahlstrom were divorced on 31 May 1973. She received, among other properties, Ruggles mine in the settlement (GCRD 1973b). From the plethora of filings in the Grafton County Register of Deeds, it probably was not an amicable divorce (GCRD 1973a, -b, 1974a-e, 1977 and 1984). Geraldine remarried around 1978 to Robert Nelson Searles (1919-2003). They remained married for the remainder of their lives. In 1984, a new firm was established, Ruggles Mine, Inc. with Geraldine as President and Robert Searles as Vice President. They operated Ruggles mine and other business dealings in the following years (GCRD 1984, 1993, 2003, 2011; Valley News, 1989b).

Ruggles Mine, Inc. got a very positive review in “Day Trippers: Spur-Of-The-moment Vacations Close to Home” (Valley News, 1988 Aug 3). Ruggles was compared to other geological attractions in New Hampshire and was described as “visually arresting” and “genuinely interesting.” It got, perhaps, a bit *too* interesting in 1989 with a rock fall while visitors were in the mine (Valley News, 1989b). No one was injured, and the mine was closed only temporarily.

In 2016, Geraldine’s health was declining, so the family decided to sell the property (Valley News, 2016 Jun 17; Concord Monitor, 2018 Jul 16). The sale was finally executed over several months in the Summer through Fall of 2019; it was not a simple sale (GCRD 2019a-d).



Manchester Union Leader 1964 June 26

Evolution of the Current Appearance

Figure 15 illustrates the evolution of the main pits from 1938 to 1944. Outlines of Shaub 1938 (blue) and Bannerman 1941 (red) are overlaid on Cameron 1944 (black). The growth of the pit sizes is quite dramatic as the wall expansion engulfed previous pits. All three maps were rotated such that magnetic north was facing up. Moving from northeast to southwest:

- The current entrance open cut at the northeast end of the mine remained unchanged from 1938 to 1944, but the blind drift at the end of the open cut was extended in 1941 and included a side offshoot. The side offshoot was used as a fluorescent display area between 1963 and 2016, taking advantage of the darkness in the tunnel. The blind drift was extended into the big open pit, most likely in the late 1950s to early 1960s, to become the current entrance tunnel from the parking lot.
- Shaub's Pit C was expanded in length and width from 37 by 47 feet to 53 by 71 feet by 1941; it was about the same size in 1944. At that time, a wall still separated Pit C from the other pits to the southwest.
- Shaub's Pit A expanded substantially by 1941 to overtake and include Shaub's Pit B (labeled by Bannerman as "Pit #1" and by Cameron as "Pit A" (more in line with Shaub)). With Cameron, this large Pit A now had two shafts to lower-level stopes. Bannerman referred to both as "winzes" [Figure 10] while Cameron calls them North Shaft and South Shaft [Figure 12].
- Cameron et al.'s Pit D did not exist in 1938; it was opened between 1938 and 1941. It was originally about 39 by 59 feet in 1941, then expanded to 93 by 120 feet in 1944. The wall between Pit D and Pit C shrank from 65 feet in 1941 to 33 feet in 1944, eventually merging the two pits; the former Pit D became part of the upper end of the big open pit we see today [Figure 1, location 10].
- Before Pit C and D merged, two blind drifts appeared on the western wall of Cameron's Pit D [Figure 12, Figure 13] (Cameron et al. 1954:237). The northern-most drift, worked in October 1944, can be seen today just west of the current entrance tunnel where it enters the big open pit [Figure 27].

Figure 16 shows the current big-pit outline as viewed from above using a Google Earth image compared to Shaub's 1938 pit outlines from Figure 5a. The 1938 pits are remarkably small in comparison and comfortably fit in the lower two-thirds of the current open pit. At the northeast end is Shaub's Pit C, roughly oval, about 37 by 36 feet. Below ground, the northeast face of Pit C extends about 10 feet further as indicated by the thin line. Shaub's Pit A was the largest pit at that time, about 115 by 75 feet at the extremes. Shaub's Pit B is the smallest of the three, which features a shaft (shown as a 14 by 18-foot oval within the pit) that provides access to the older Stope #2 at the 140-foot level.

Figure 17 shows the current pit compared to Cameron's 1944 pit outlines from Figure 12. At the present time, Pit D merged with Pit C, and that merged with Pit A to form one large open pit. This left a blind drift in Pit D [Figure 13] orphaned high on the northwest side wall next to the entrance tunnel [Figure 27]. Feldspar mining in the late 1950s to early 1960s further expanded the width of the open pit, especially at the northeast end, doubling at the widest point to almost 153 feet at the surface (less at the floor due to the slope of the walls). The galleries in the northeast end (underground to your left just as you enter the open pit from the entrance tunnel) were part of the 1960s feldspar mining by Golding-Keene (GCRD 1961a, 1962). The "waist" near the middle of the big pit is about 113 feet, its narrowest point. Towards the southwest end, the width opens back up to about 134 feet. Overall length from northeast to southwest is about 368 feet.

Bannerman and Cameron refer to two lower stope levels: 120 feet and 140 feet (referenced by Shaub to the original peak of Isinglass Mountain above his Pit C for his "zero" reference level). With the expansion in length and width, the main pit also saw an increase in the pit's depth. First the 120-foot level became the floor of the open pit, then the 140-foot level became the pit floor, particularly towards the southwest end. Today, the floor of the open pit slopes down from the northeast entrance toward the southwest. The exit tunnel in the southwest was part of the 140-foot level (labeled "Stope #2" on Shaub), and can be seen in Figure 23, a Post Card most likely from the early- to mid-1960s. Remnants of the 120-foot level (labeled "Stope #3" on Shaub), can be seen in the sidewalls, particularly towards the south end along the western wall.

The current parking lot area was constructed from dump material, most likely in the 1960s, to level off the previously downward-sloping terrain. Based on its mineralogy, some of the fill material was certainly from the west-side dump. This same dump material has also been used to fill in unpaved sections of the modern access road. Similarly, the overlook area outside the southwest exit tunnel was also leveled off with dump material, adding boulders as a border along the edge of the steep drop off [Lidar view in Figures 1 & 22].

Acknowledgements

The author is most appreciative for access to the mine property by the current owner, and Patrick Bigos for sharing his discoveries while exploring the mine property. He is also extraordinarily grateful to William Guth for his assistance in digitizing and cleaning up the image of Shaub's enormous plan view map (all 400 MB!). The author wishes to thank Harold "Fritz" Moritz, Dana Morong and Patrick Bigos for reviewing the manuscript. Research at the Grafton County Register of Deeds would have been much more difficult without the help of Ms. Kelley Monahan and her wonderful staff; thank you all for your patience and interest. As before, internet access has its limits; physical presence is often required for serious research.

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[GCRD, cont'd.]

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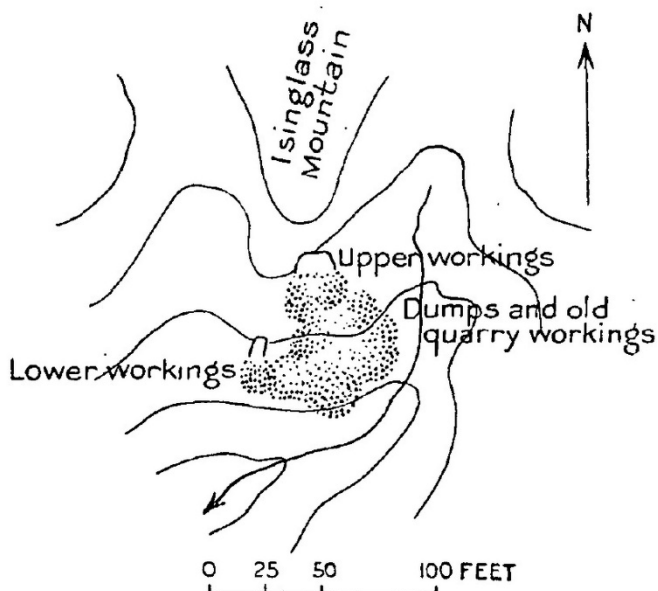


FIGURE 35.—Sketch showing relative position of upper, lower, and old workings and dumps of Ruggles mica mine, on the south end of Isinglass Mountain, Grafton County, N. H.

Figure 2. Sterrett Figure 35. From Sterrett (1923).

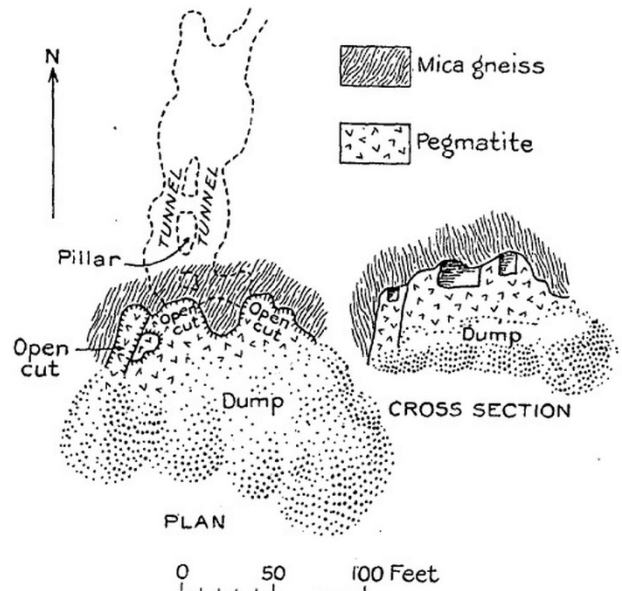


FIGURE 36.—Plan and cross section of upper workings of the Ruggles mica mine, Grafton County, N. H., showing geology.

Figure 3. Sterrett Figure 36. From Sterrett (1923).

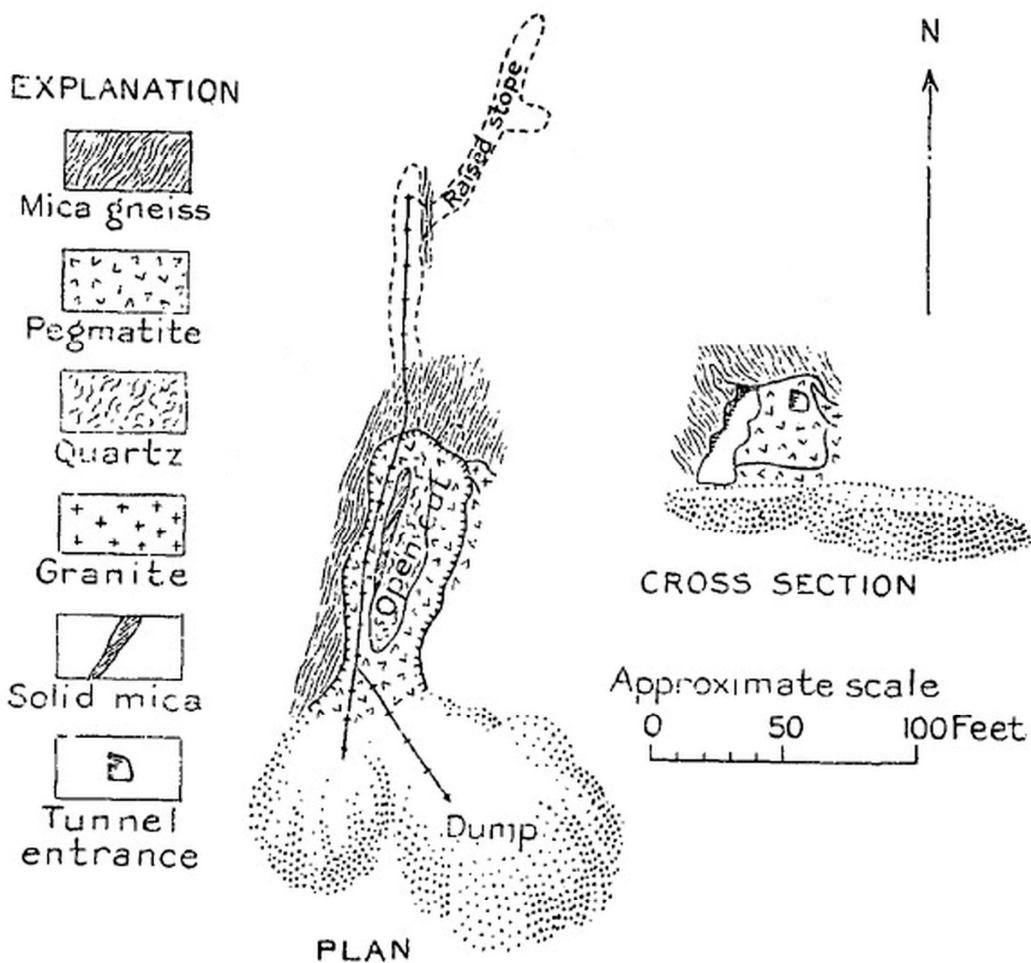


FIGURE 37.—Plan and cross section of lower workings of the Ruggles mica mine, Grafton County, N. H., showing geology.

Figure 4. Sterrett Figure 37. From Sterrett (1923).

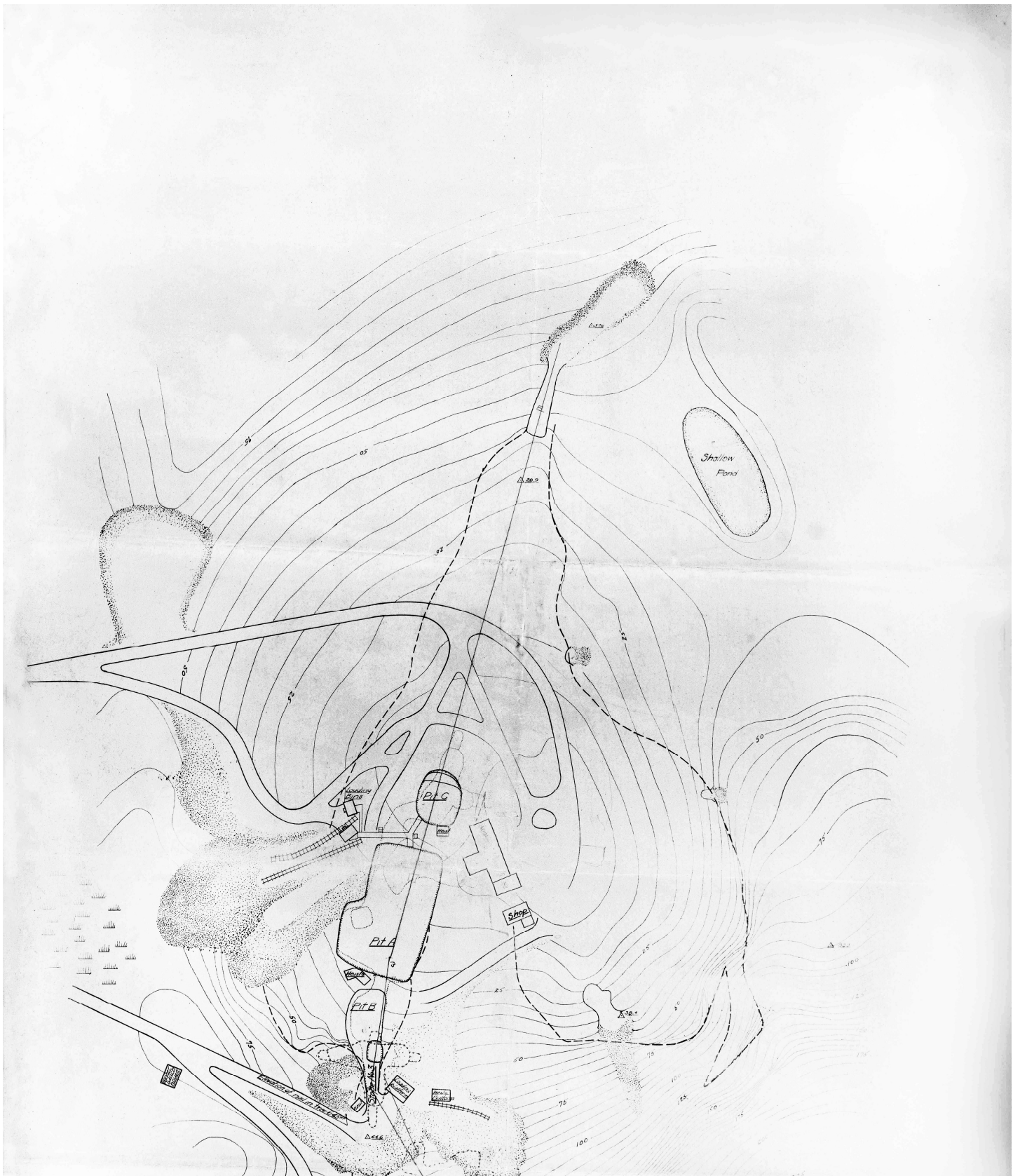


Figure 5a. Shaub Plan View, top half. The original is about 72 by 31 inches overall. From Shaub (1938).

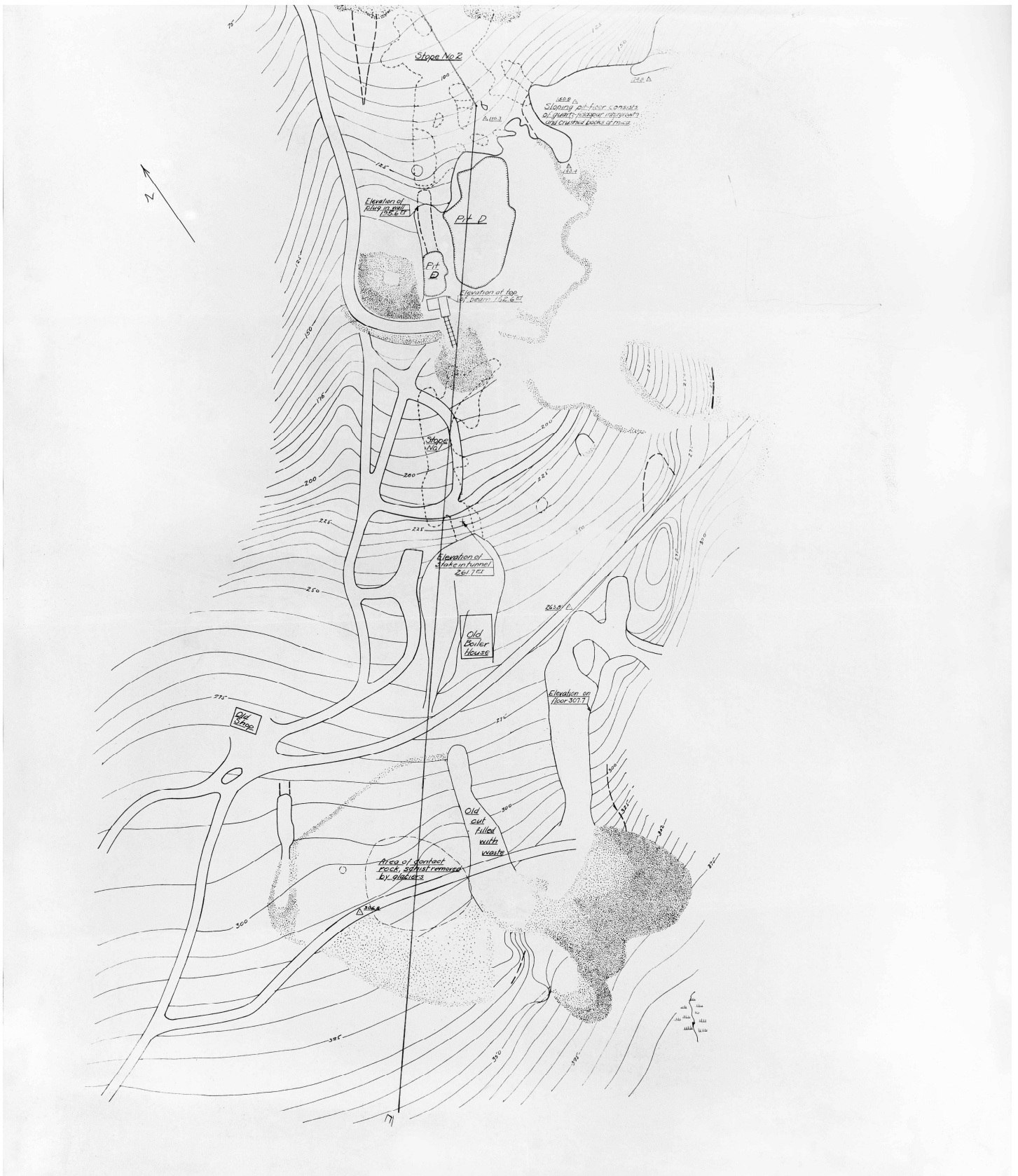


Figure 5b. Shaub Plan View, bottom half. North arrow indicates magnetic north. From Shaub (1938).

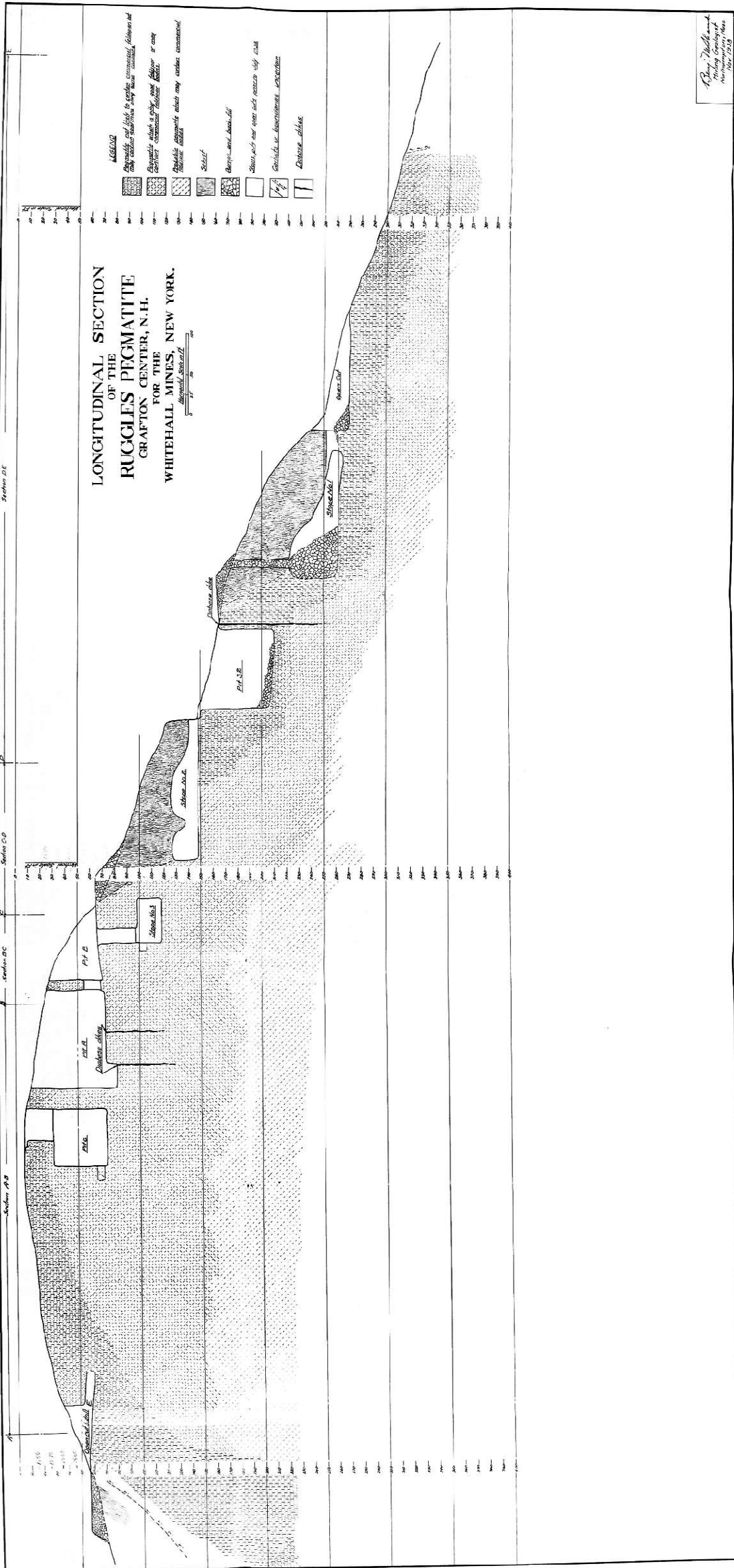


Figure 6. Shaub Longitudinal Section View. His vertical zero reference was the peak of the mountain near Pit C (now long gone). Section line and lettered break points A-E refer to Plan View [Figures 5a, -b]. From Shaub (1938).

Bury: McKeown
 Mining Geologist
 Northampton, Mass.
 Nov. 1938.

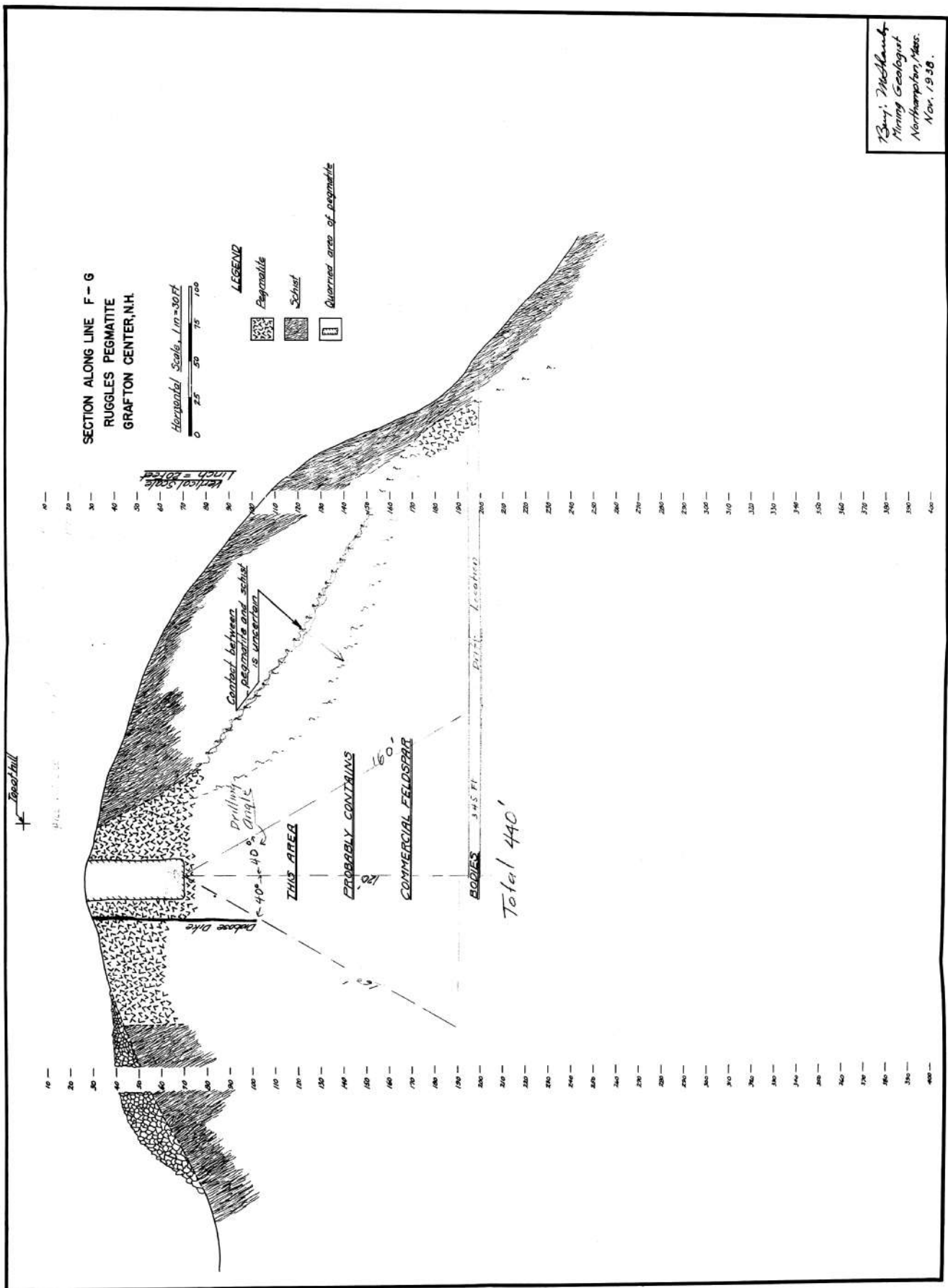


Figure 7. Shaub Section F - G. From Shaub (1938).

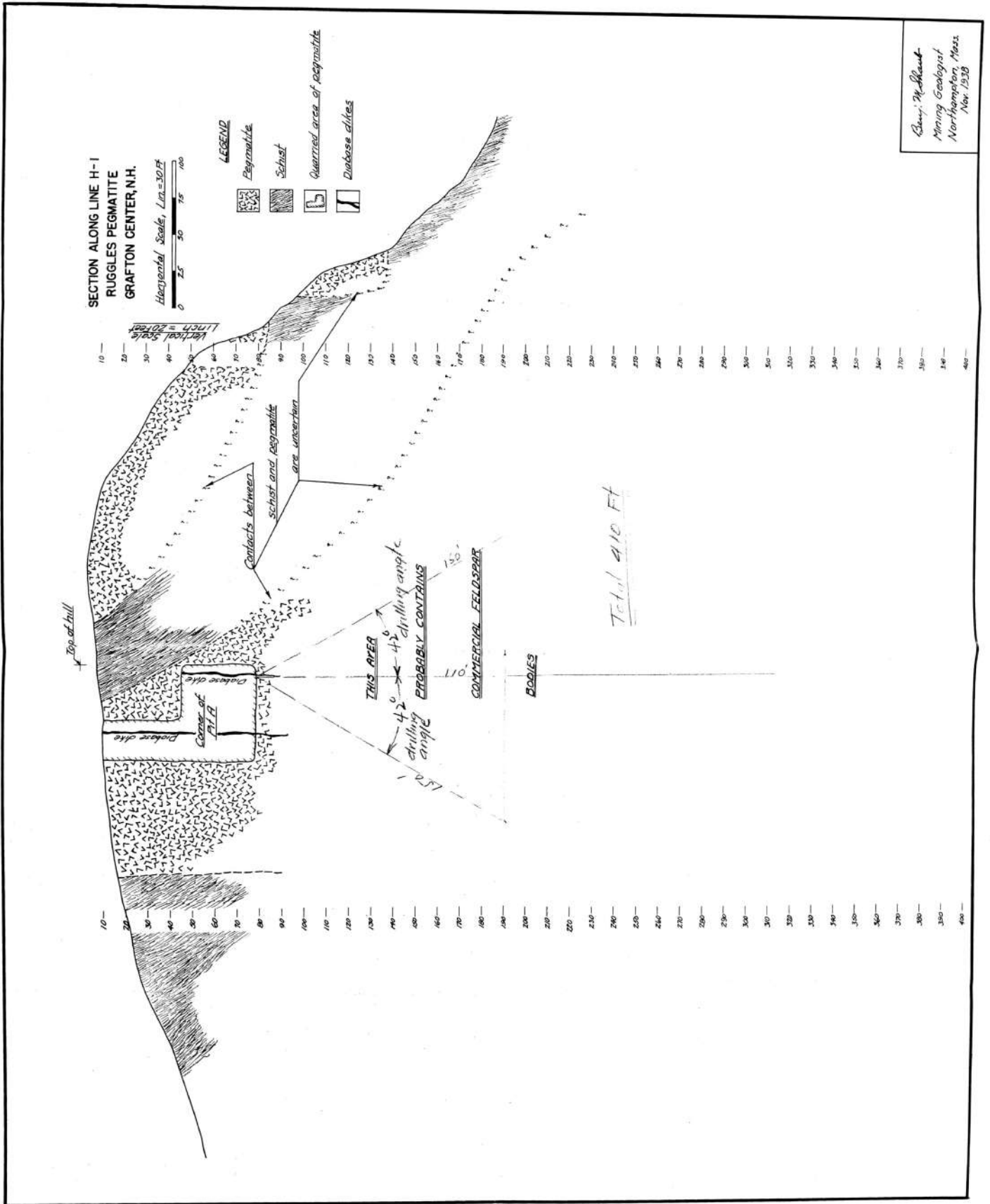


Figure 8. Shaub Section H - I. From Shaub (1938).

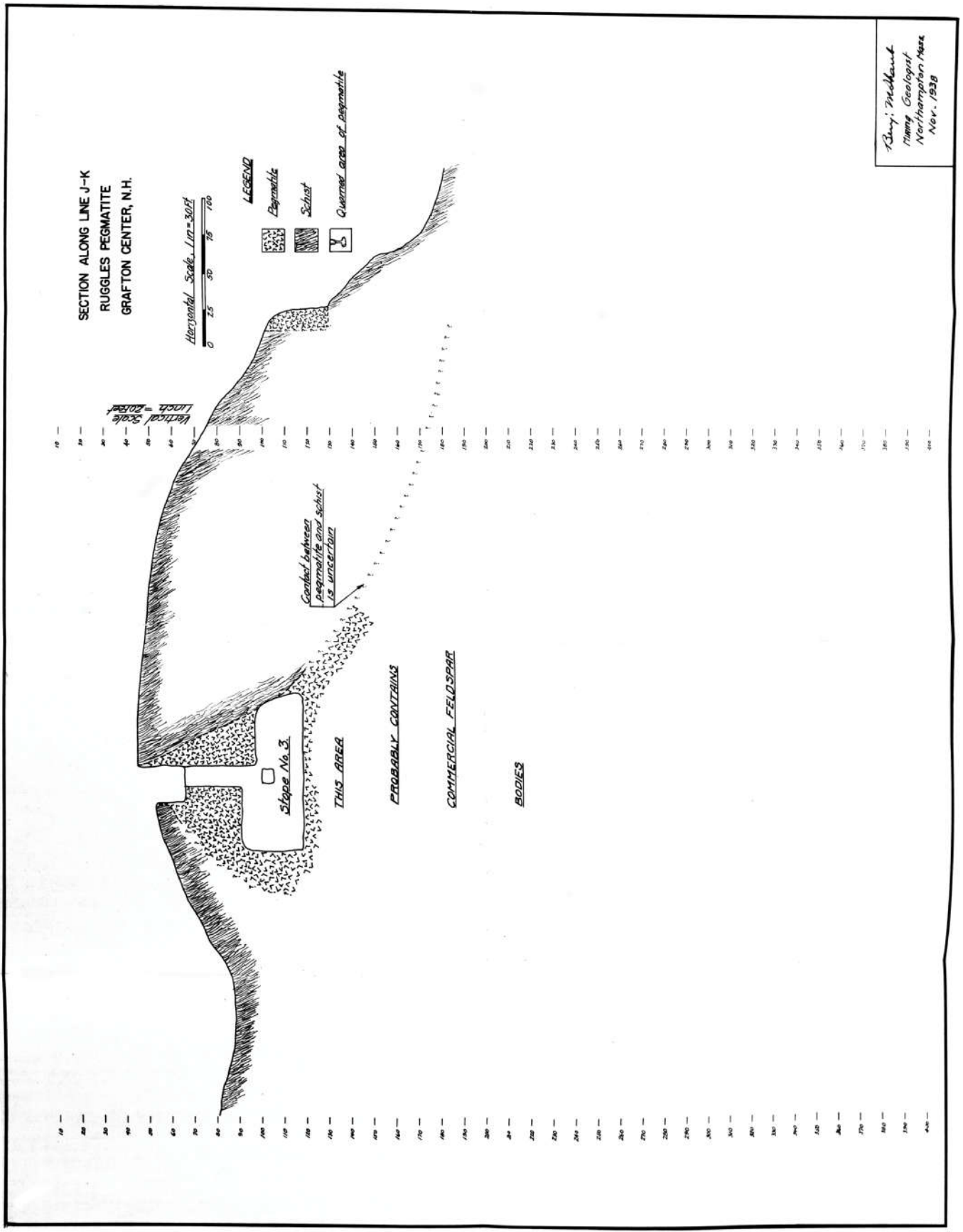


Figure 9. Shaub Section J - K. From Shaub (1938).

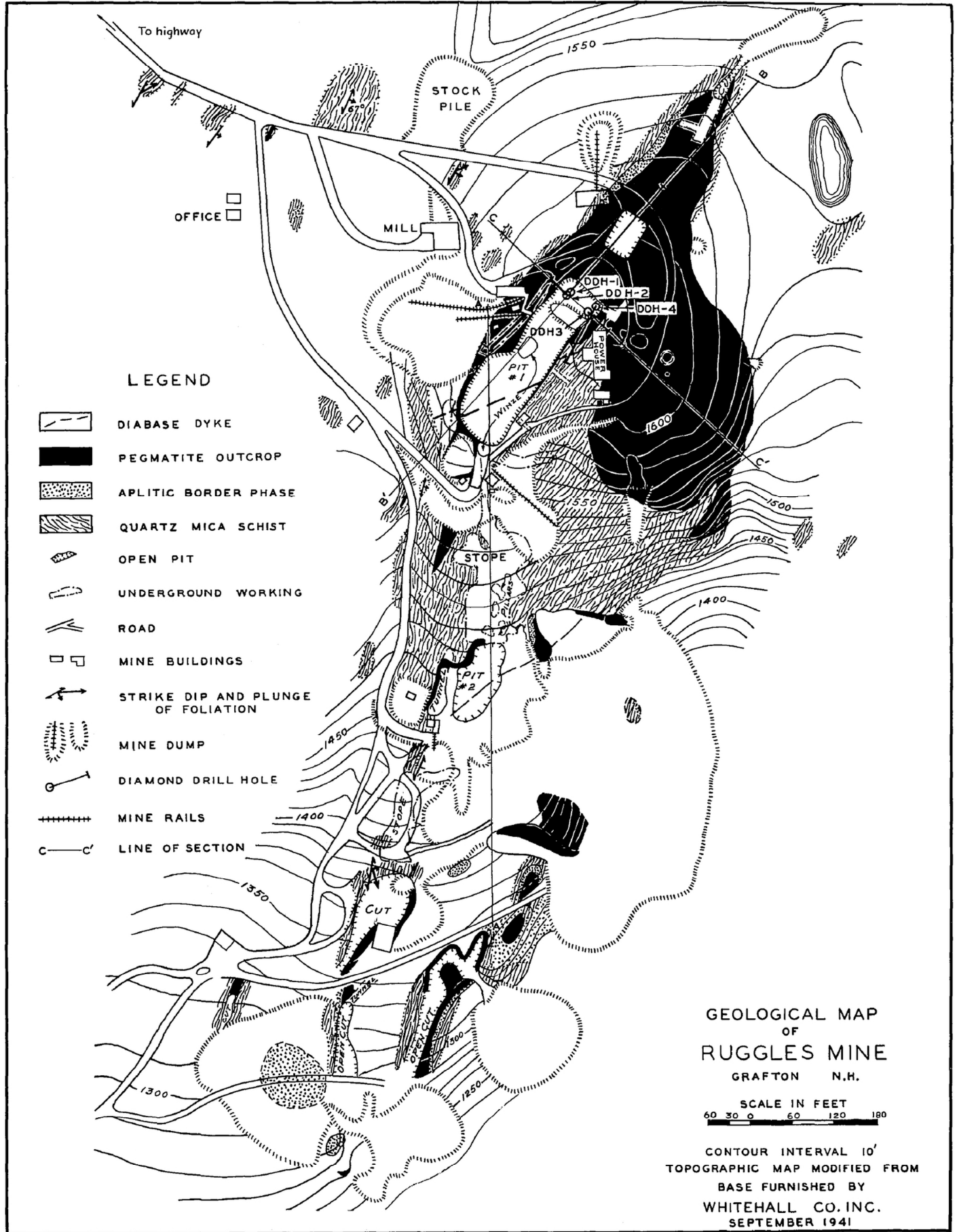


PLATE I

Figure 10. Bannerman 1941 Plate 1: Plan View. From Bannerman (1943).

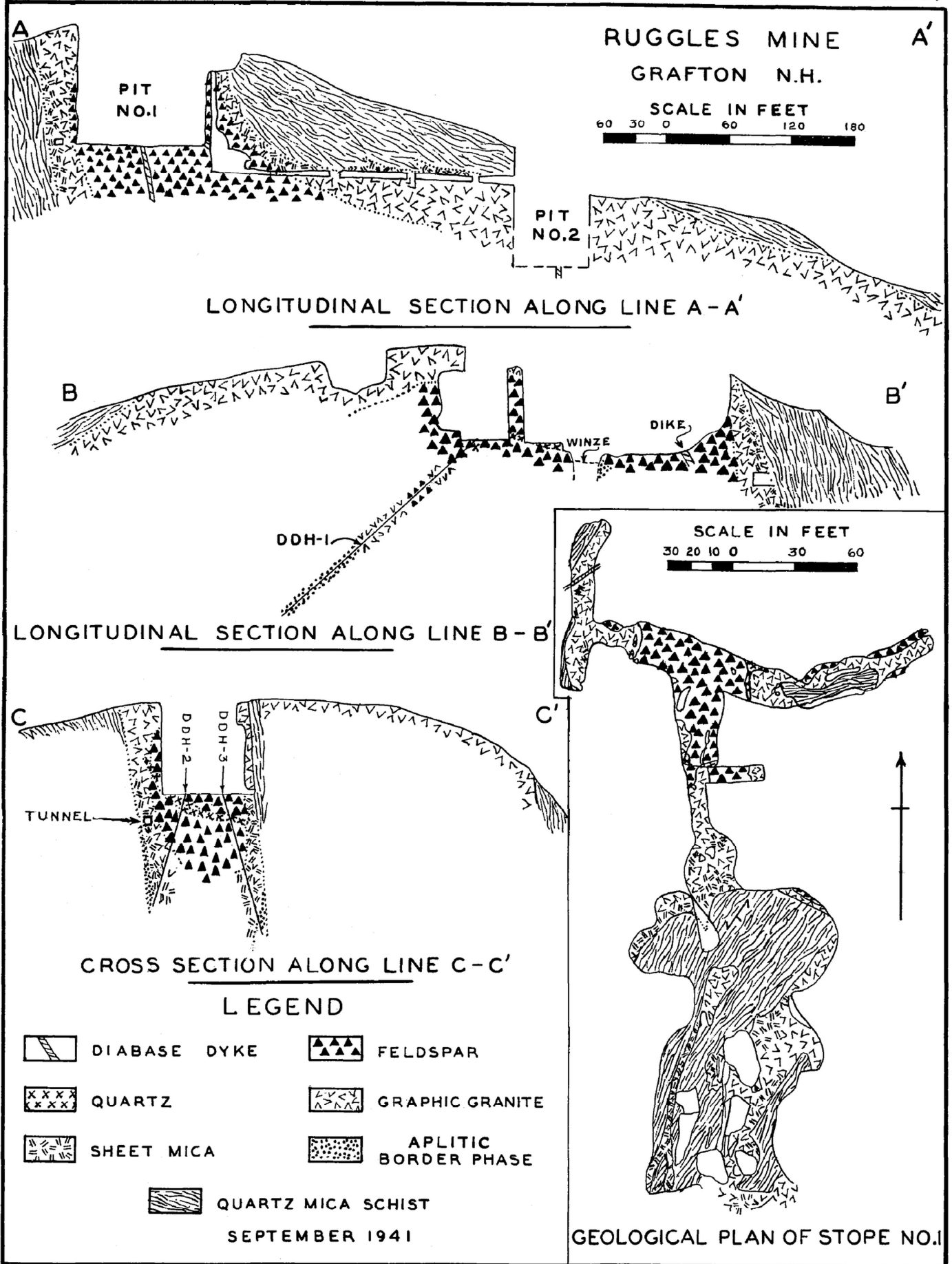


FIG. 5

Figure 11. Bannerman 1941 Figure 5: Section Views. From Bannerman (1943).

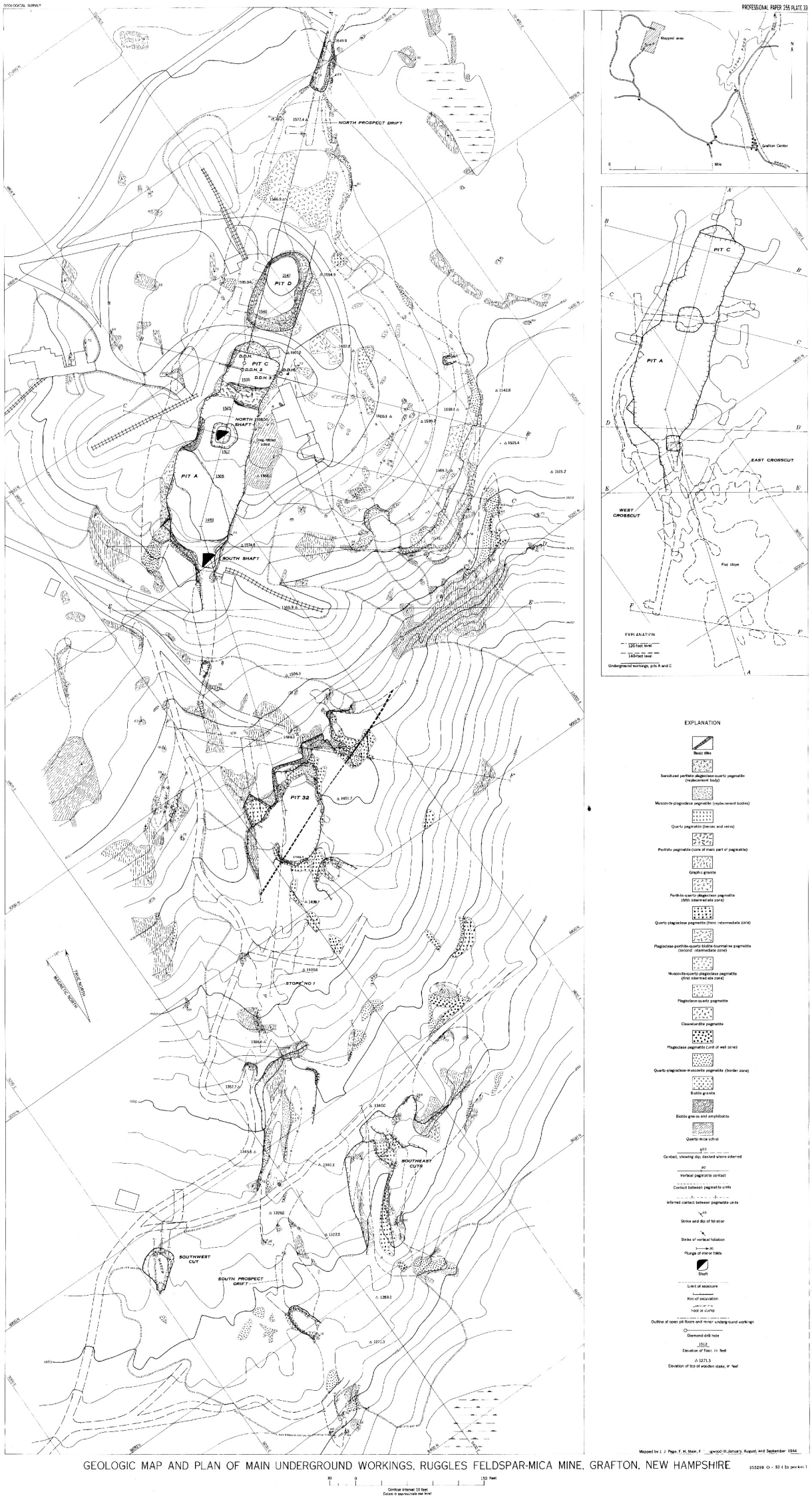
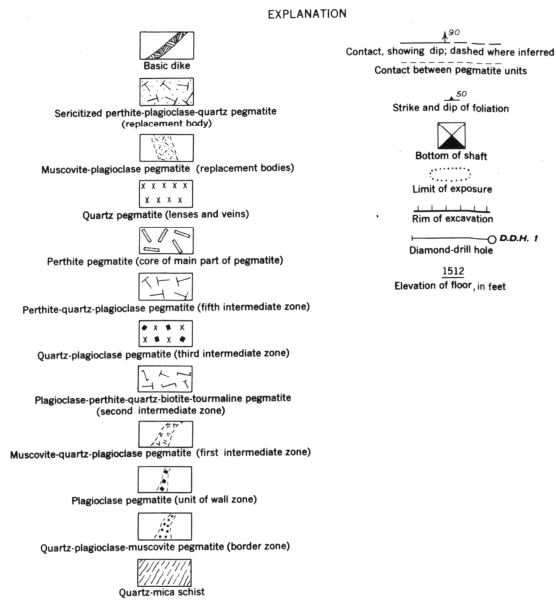
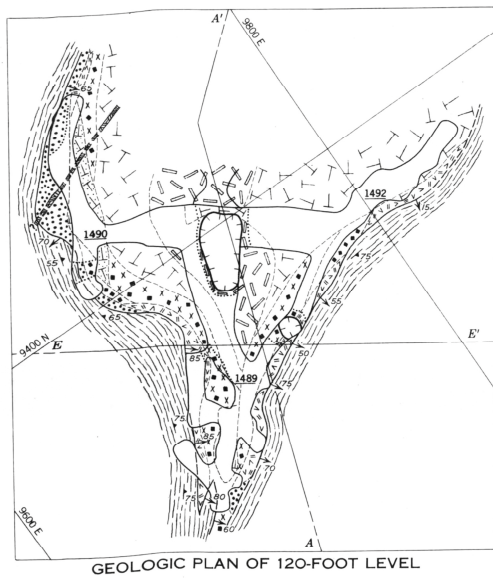
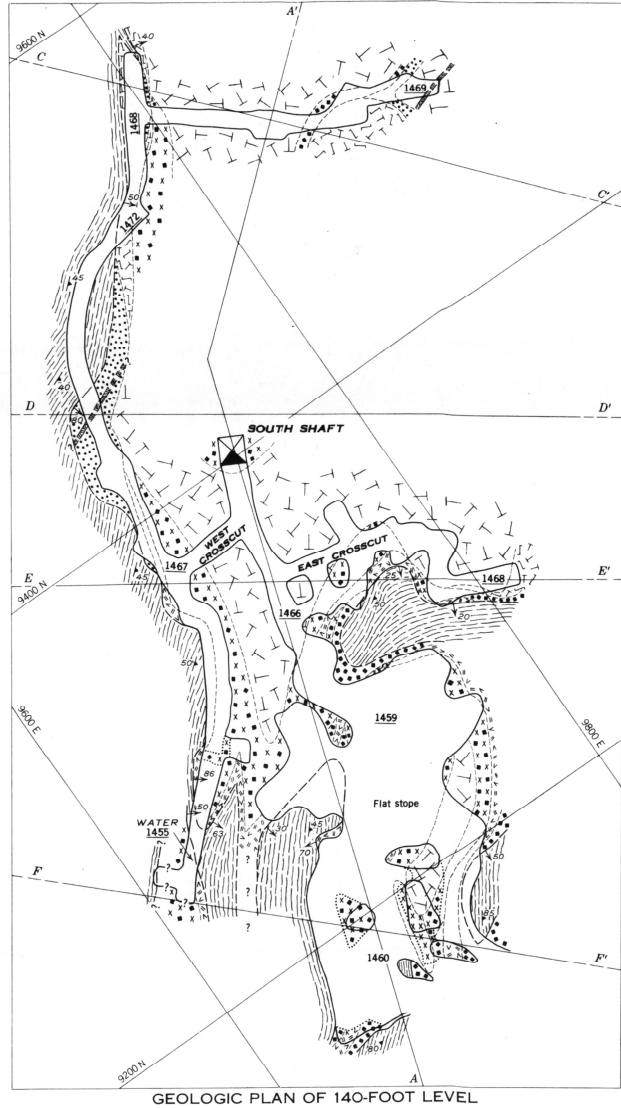
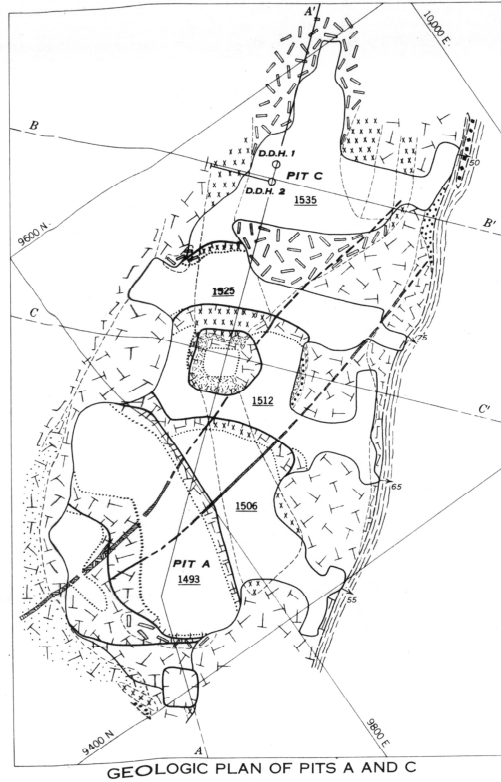
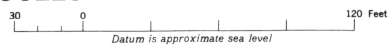


Figure 12. Cameron 1944 Plate 33: Plan View. From Cameron et al. (1954).



Mapped by J. J. Page, E. Ellingwood III, F. H. Main, January and September 1944

GEOLOGIC PLANS OF THE RUGGLES FELDSPAR-MICA MINE, GRAFTON, NEW HAMPSHIRE



255298 O - 53 (In pocket)

Figure 13. Cameron 1944 Plate 34: Plan View Details of Levels. From Cameron et al. (1954).

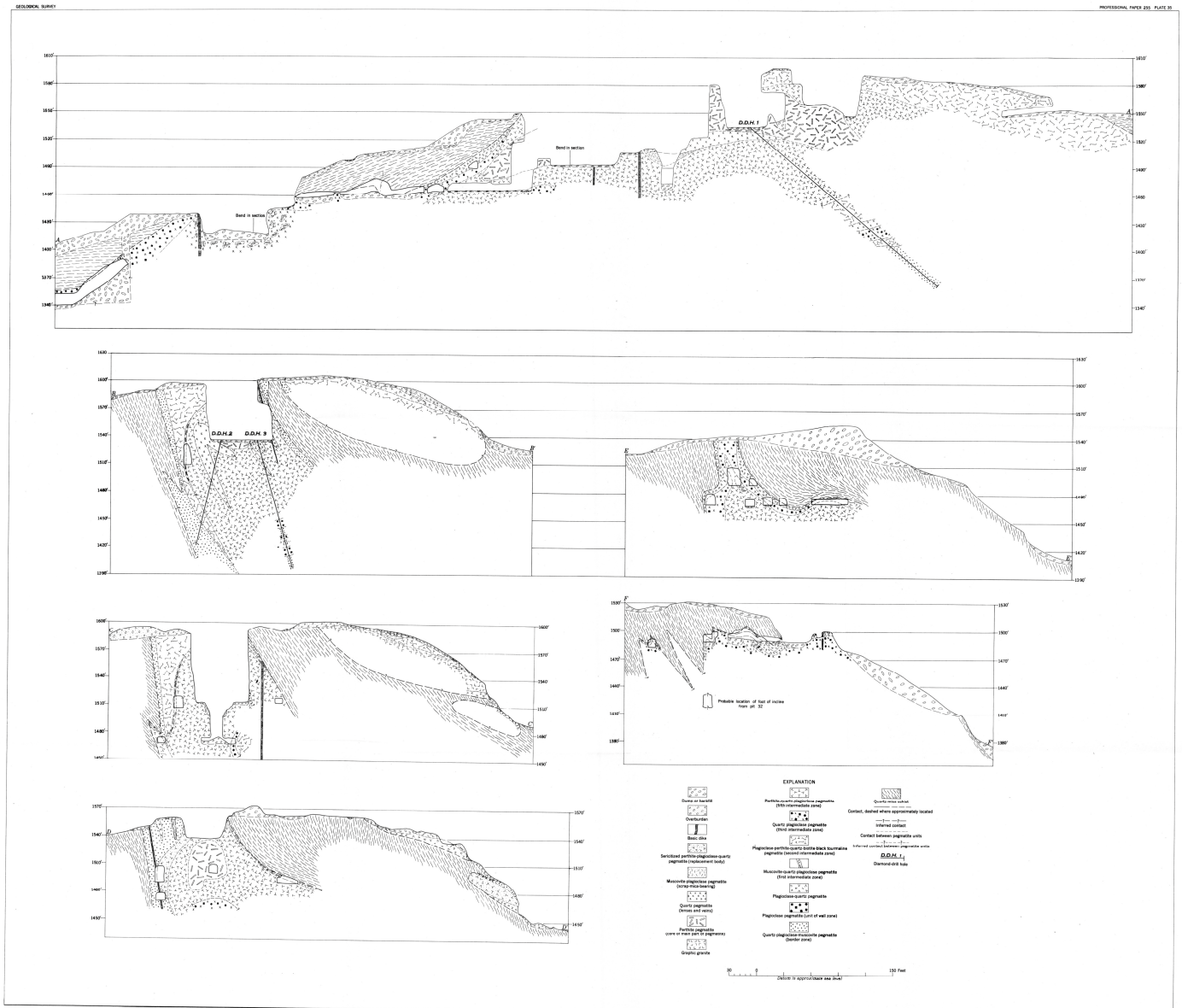


Figure 14. Cameron 1944 Plate 35: Section Views. From Cameron et al. (1954).

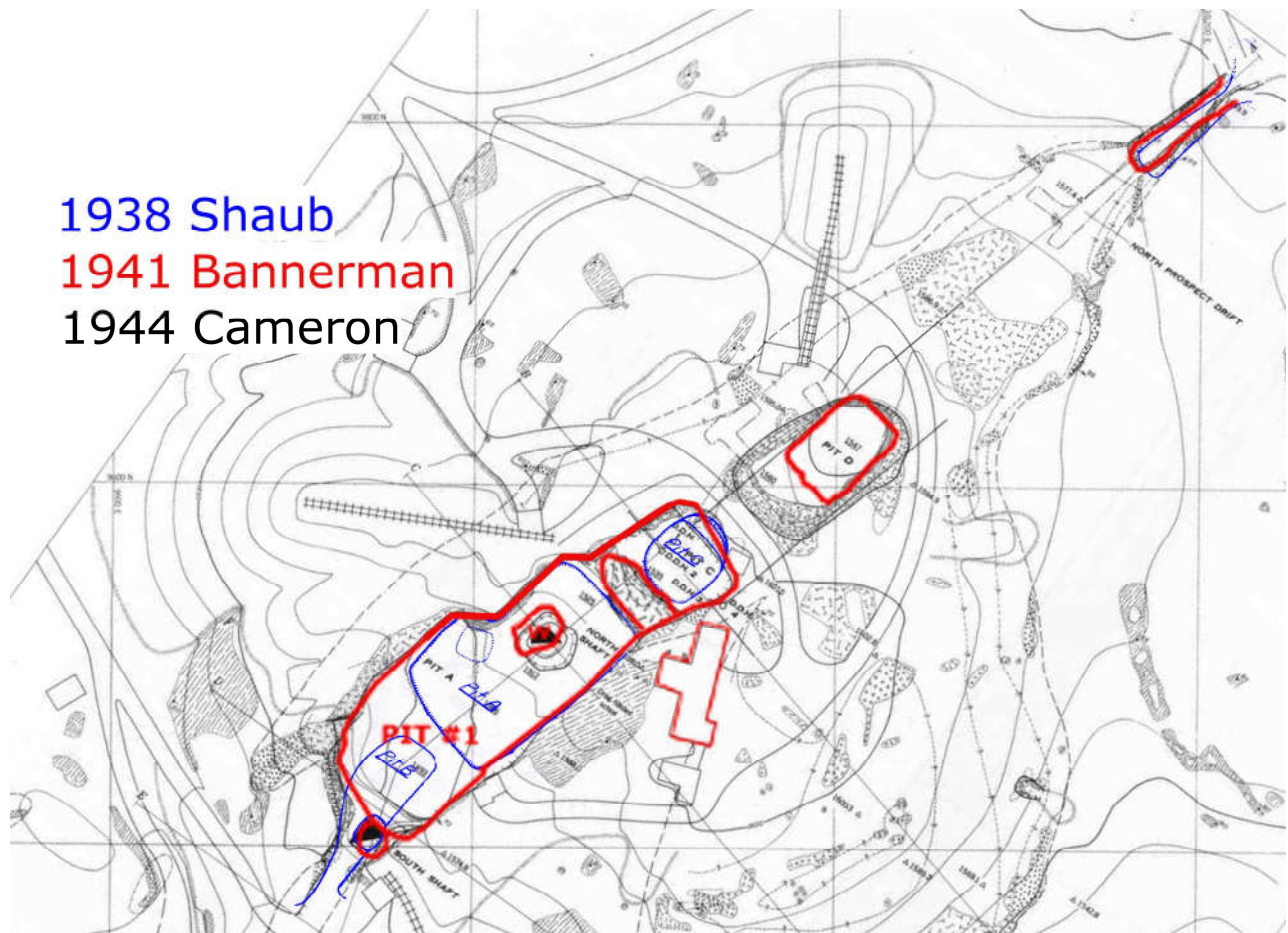


Figure 15. Overlay of pit outlines for Shaub, Bannerman and Cameron et al. and the year mapped.



Figure 16. Overlay of Shaub pit outlines on Google Earth view.



Figure 17. Overlay of Cameron et al. pit outlines on Google Earth view.



Figure 18. Lower open cut, outside Stope #1 [Figure 1: 4].
Photo by the author, 2020.

Figure 19. Cart rail near lower open cut, outside Stope #1. Photo by the author, 2020.

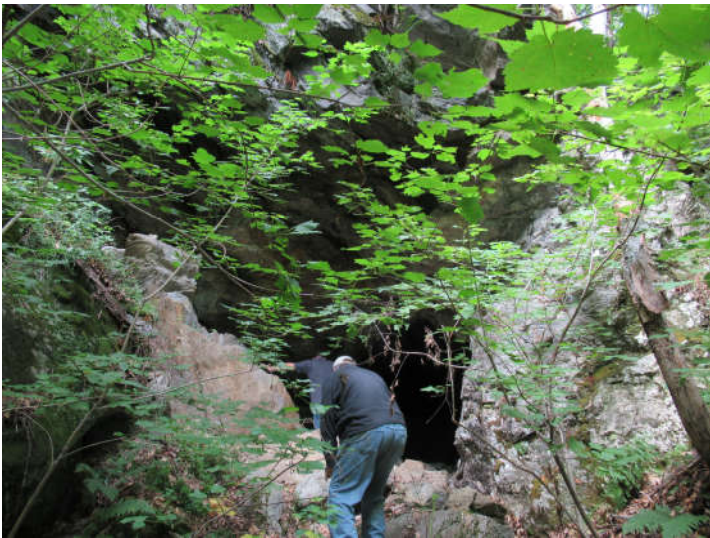


Figure 20. Stope #1 entrance. Compare with “cross section” on Figure 4. Photo by the author, 2020.

Figure 21. Looking out of Stope #1, towards lower open cut. Photo by the author, 2020.

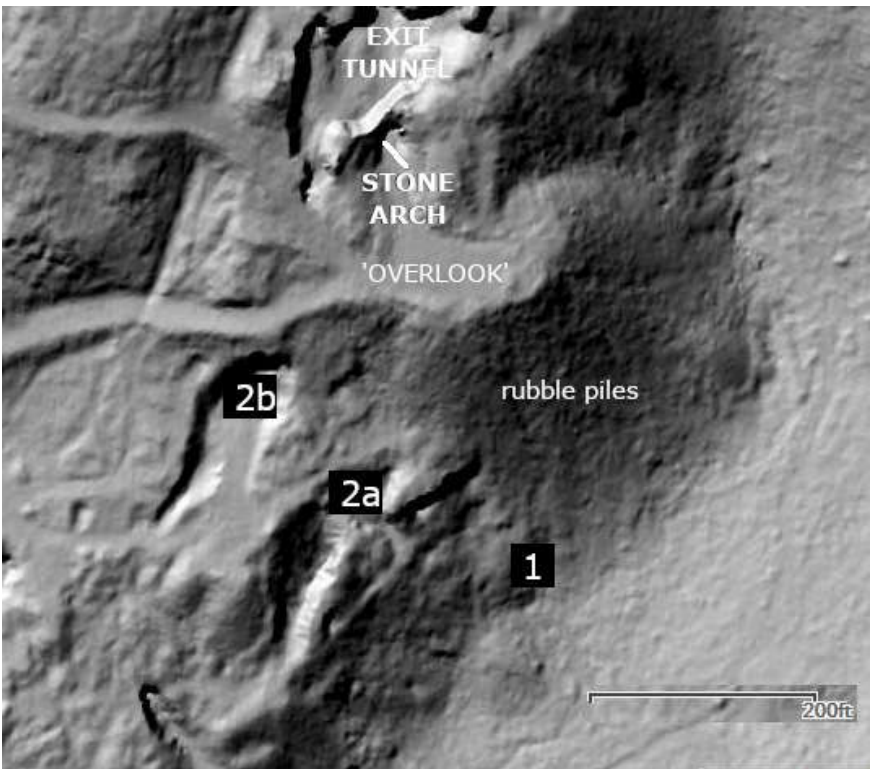


Figure 22. Lidar view of southwest end, Ruggles mine. The exit tunnel is at the top of this image, and the stone arch just below that. Flat area below the arch is the south-facing overlook area. “1” is a possible location for Ruggles’ open pit workings covered with rubble along the southeast slope. “2a” and “2b” are Randall workings. “2b” includes an open cut with cart rails and Stope #1 that extends under the overlook area [Figures 18 – 21]. From NH Stone Wall Mapper [NHSWM].



Figure 23. Old Post Card, ca. 1960s, showing Stope #2 entrances at the 140-foot level. Compare with “cross section” on Figure 3. The right-hand side is the current exit tunnel from the open pit [Figure 1: 8].



Figure 24. Interior of a side gallery along the eastern wall in the southwest end of the open pit. Photo by the author, 2022.

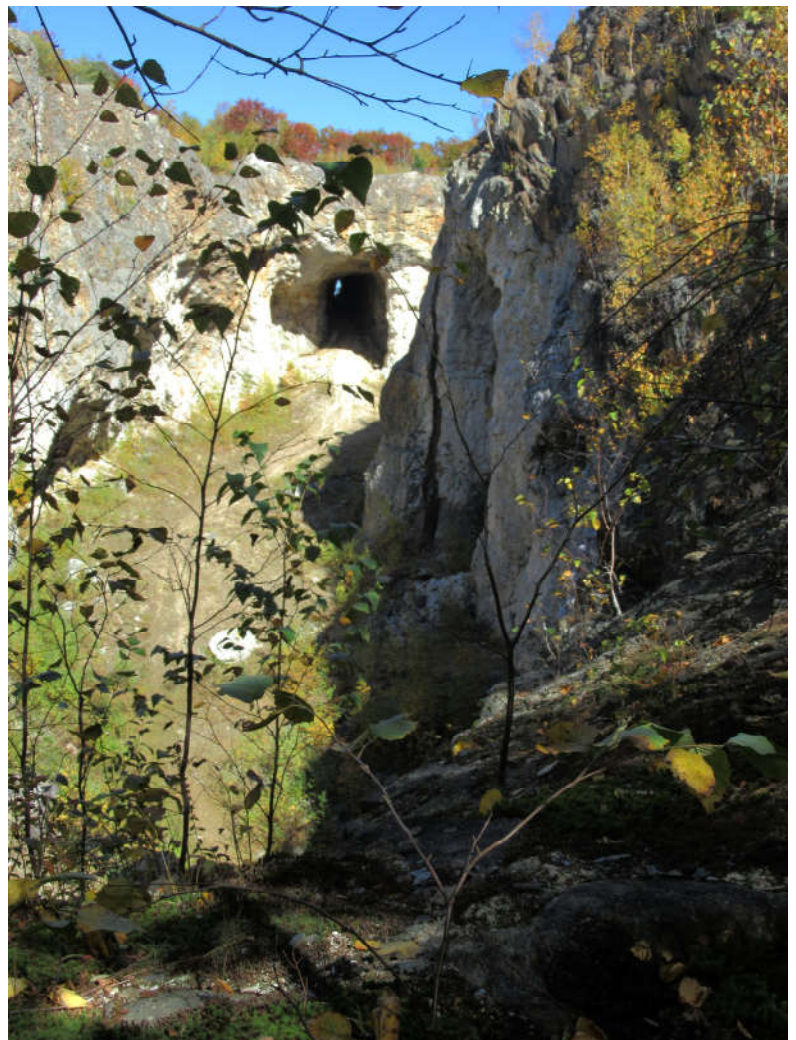


Figure 25. Uncommon view of the open pit from the southern rim (above the southwestern exit tunnel) looking northeast towards the entrance tunnel from the parking lot. Entrance to the side gallery in Figure 24 is visible on the near side, right-hand wall. Photo by the author, 2022.



Figure 26. Concrete structures outside the northwest corner of the open pit near the area labeled “Mill” in Figure 10. Photo by the author, 2022.



Figure 27. Blind drift, formerly in the wall of Pit D of Cameron in 1944 [Figure 1: 10; Figures 12 & 13], now above the entrance tunnel to the parking lot. Viewed from above. Photo by the author, 2020.