

The History and Geology of Iron Mines in and Around Port Henry, NY.

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Overview

Port Henry and the surrounding towns of Mineville, Witherbee and Moriah might seem a little run down now, but for the past one-hundred and fifty years they were bustling mining and industrial towns with vibrant economies and high levels of employment. The towns were built around one natural resource, iron, which was found in rich veins of magnetite in the Adirondack foothills around the western shores of Lake Champlain. The geologic processes that enabled the success of these towns began over a billion years ago as the raw materials for the iron were deposited in sediments on the vast supercontinent that would later become North America. The iron industry carried these towns well into the 20th century, but collapsed in 1971. While the loss of jobs and economic distress caused by the closure of the mines certainly was a difficult blow for the Port Henry-Moriah community, they have shown resilience and a strong commitment to their industrial history that affected the entire country.

The History of Iron in the Adirondack Mountains: The Last 1.1 Billion Years

Before the Grenville Orogeny began 1.1 billion years ago, layers of sediment were deposited in shallow seas across proto-North America. The rocks from the Grenville Orogeny are what would become the basement of New York state and regions to the north and south. Four hundred million years of erosion buried the Grenville rocks under layers of sediment. Subsequent tectonic events and erosion over the next 550 million years buried the region under more sediment. While the Appalachian and Green Mountains have been eroding for the past 220 million years, the Adirondack Mountains have actually been rising! In fact, in 1980, measurements showed their growth rate to be about 3 millimeters per year, which is about thirty times the rate of erosion. But how could it be that such young mountains could be made up of such ancient rocks? The answer is still debated, but geologists suspect that a hotspot formed under the crust which heated the surrounding material underneath the Adirondack Dome (figure 1). This caused it to expand and rise between 10 and 20 million years ago. Since then, erosion has carved out the mountains we see today. Hence, the Adirondack Mountains are often described as “new mountains from old rocks.” (Isachsen, 1991)

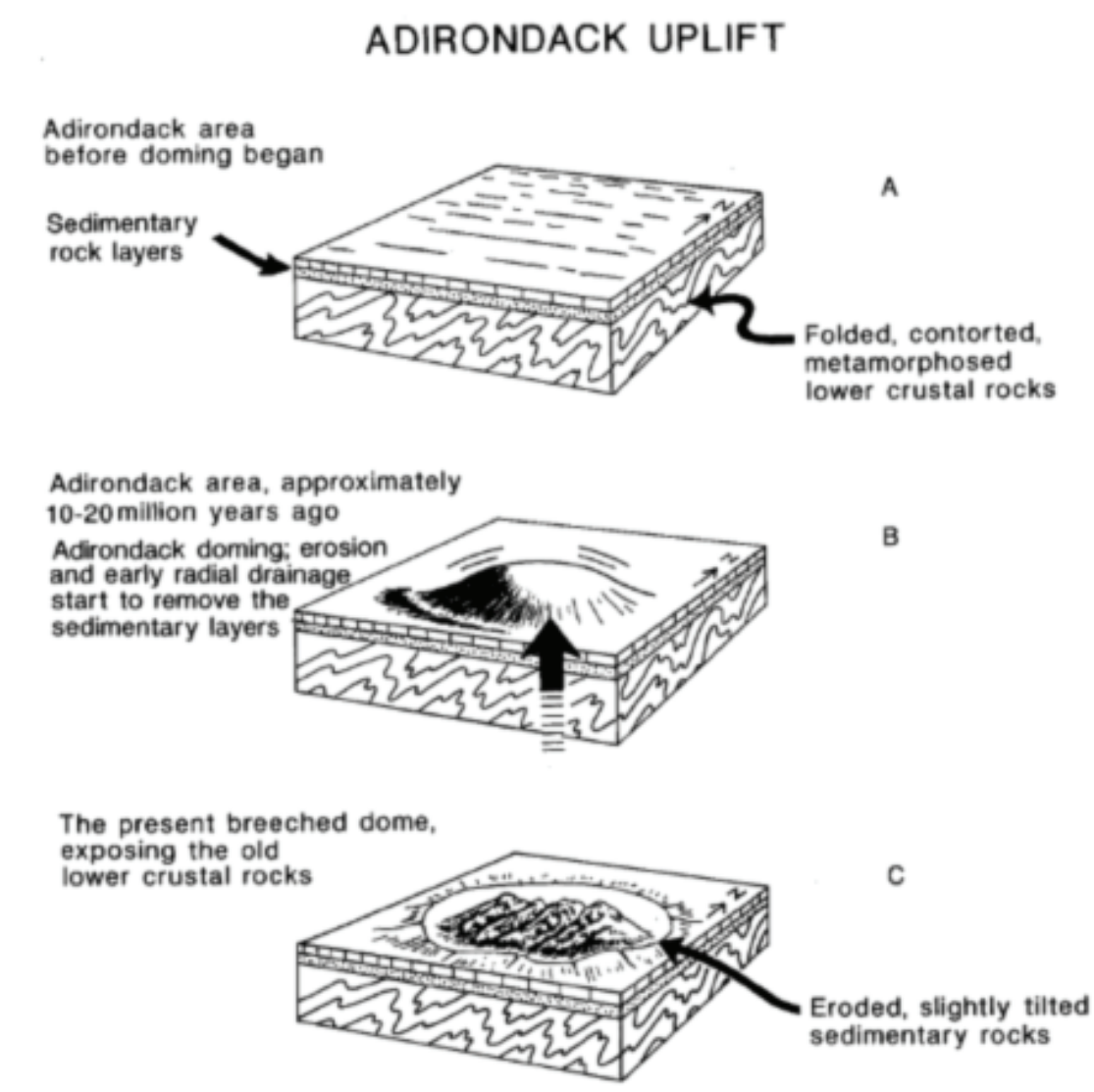
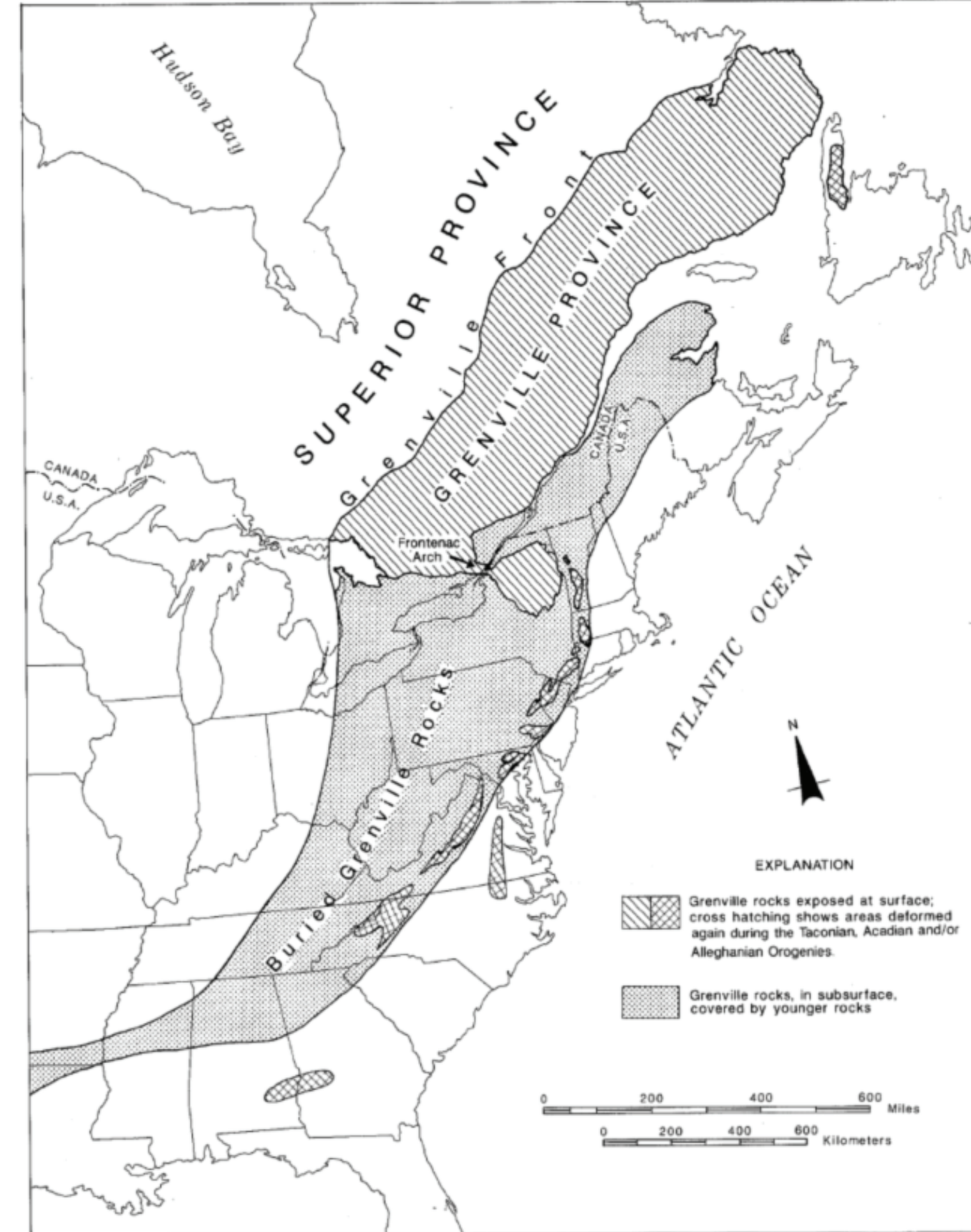


Figure 1 This oversimplified cartoon is helpful to illustrate the Adirondack Dome and the subsequent erosion that transformed the mountains we know today. (Taken from Isachsen, 1991)



A painting by landscape artist, Homer Dodge Martin depicting the Craig Harbor Mines near Port Henry. (Taken from Google Images)



This map shows the extent of the Grenville province. The cross hatching indicates areas where Grenville rocks have been deformed by subsequent orogenies. This map also shows the dome shape of the Adirondacks. (Taken From Isachsen 1991).

It is in these “old rocks” that the rich iron deposits that made Port Henry mining capital of the Adirondacks would be found. “Almost all of the rocks in the Adirondack region are metamorphic rocks” but while this metamorphic bedrock is buried deep beneath miles of sediment elsewhere in the Grenville province, it is exposed in the Adirondacks as the hotspot thrust the bedrock upwards. This metasedimentary bedrock was formed from the sediment that was deposited in shallow seas before the Grenville Orogeny, at depths of 25-30 kilometers at temperatures between 750 and 800 degrees Celcius and pressures 7-8 times sea level pressure. (Isachsen, 1991) The metaigneous rocks that can be found in the Adirondacks likely originated in tectonic period during the Grenville Orogeny called the AMCG (anorthosite/ mangerite/ charnockite/ granite) orogeny that happened after a piece of the lithosphere underneath the would-be Adirondacks detached itself from the rest of the continental lithosphere allowing a burst of mantle material to surge towards the crust. During this AMCG event, iron-rich gabbros concentrated in residues in the base of magma chambers. After these chambers had cooled, they were thrust upwards in the Ottowan Orogeny which created huge mountains that were eroded to expose the basement rocks that we see in the Adirondacks today (figure 4). (Amidon, 2012) However, this is not the only source of iron veins in the Adirondacks. Some veins originated with sedimentary deposits that predate the Grenville Orogeny, particularly those in Mineville, which have been called “pre-Grenville basement” (Walton, 1963).

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Virtually all of the iron mined around Port Henry was Magnetite, Fe₃O₄, which was likely deposited in cracks, fractures or faults in surface rocks as iron precipitated from water in the presence of oxygen. (Chernicoff, 2007). Late 19th century geologic surveys determined that the magnetite in the eastern Adirondacks was usually found in quartzose, shists and limestones. (Kemp, 1897). This geologist also commented that, “what made the mines so good is that there’s a lot of [iron], and it’s very pure, with low amounts of titanium.” And while impurities were a fact of life in iron mining in the Champlain Valley, the purity of some of the veins near Port Henry was legendary. Iron tycoon of the region, Frank Witherbee once bragged to prospective investors that “the straight magnetites of the Adirondack field are nearly chemically pure.” And while this may have been an exaggeration, all ore from Port Henry was guaranteed sixty to sixty-five percent pure with some veins reaching seventy-percent purity – which was the purest iron to be mined in America to date. (Witherbee, 1916).

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the iron kings of the region, Frank Witherbee recognized this fact in a presentation to the United States Steel Corporation where he said “it was not until the completion of the Champlain Canal, which connected Lake Champlain with the Hudson River at Troy, that the real development of the district commenced” (Witherbee, 1916). Major corporations like the Port Henry Furnaces Company and the Bay State Iron Company soon began erecting furnaces and foundries in Port Henry. Trade surged up and down the lake and harbors like this one (figure 2) could see hundreds of boats a day pass through bearing charcoal or taking away ore. Thousands found employment working in Port Henry at the furnaces, the docks or the surrounding mining towns like Witherbee or Mineville. There were dozens of mine locations that brought their ore to Port Henry for refinement, each with a handful of shafts. They were numbered 1-30 based on the plot of land they were found on. Number 21 was by far the most productive of any of the mines. The surface of mine 21 can be seen in figure 3, with shafts that extended hundreds of feet into the metamorphosed Adirondack Bedrock. (Kemp, 1897)

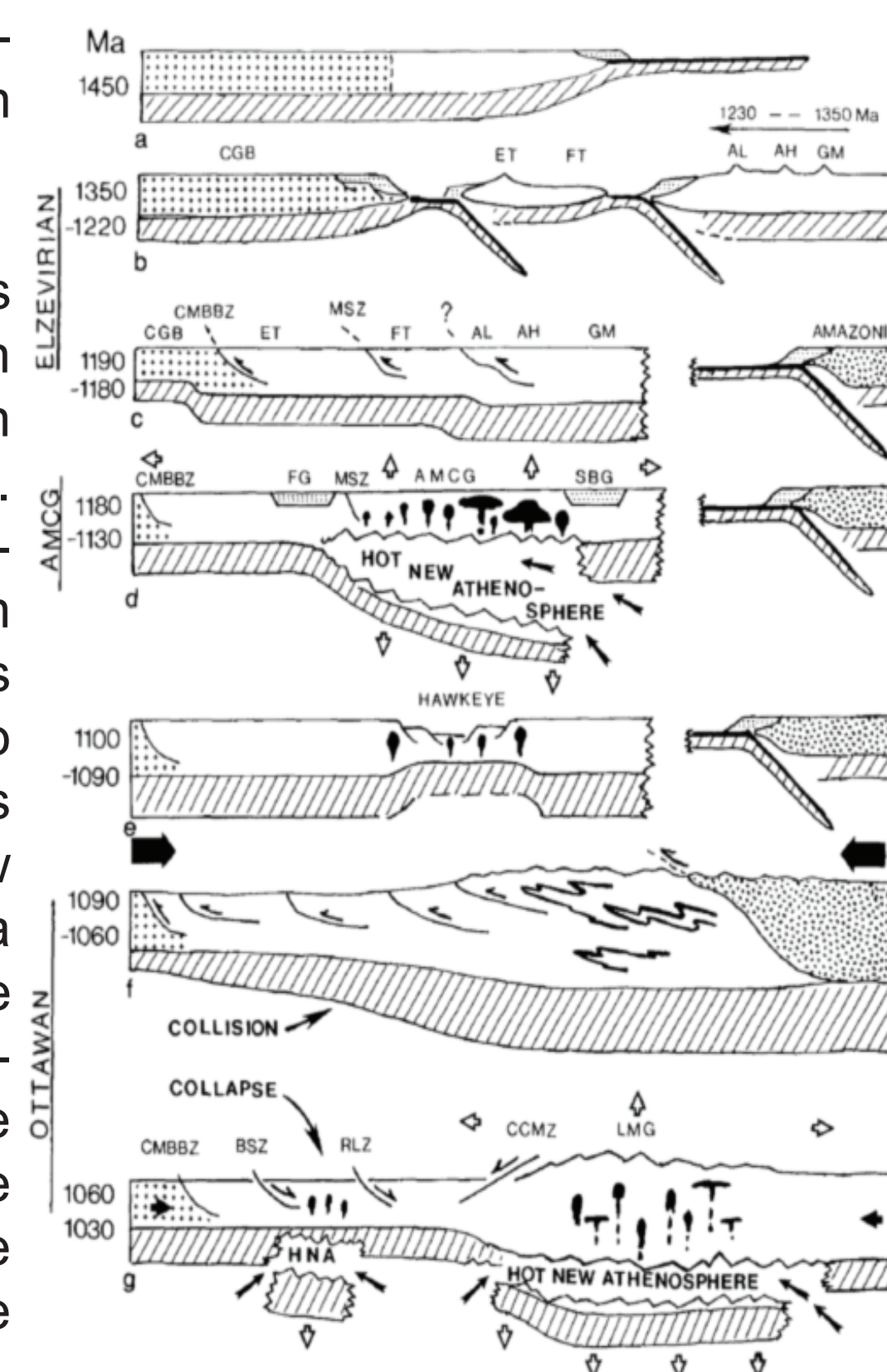


Figure 4 Shows the various tectonic phases involved in the Grenville orogeny. Do not confuse the Ottawan orogeny (f) with the Adirondack uplift in Figure 1 which occurred much more recently. (Taken from McLelland, 1996)

The History of Iron in the Adirondack Mountains: The Last 240 Years

The first industrial use of Iron in the region occurred just before the Revolutionary War when General Philip Skene was given a tract of land just north of Port Henry where he mined iron ore that was used to outfit Benedict Arnold’s fleet with cannons, anchors and other necessary metal materials. This would put the region on the map as a potentially lucrative source for iron supplies for the fledgling United States Navy, but the industry in Port Henry really exploded after 1823 when the Champlain Canal opened and ore and charcoal to fuel the massive furnaces, like the one built the year before could be shipped up and down the lake. One of

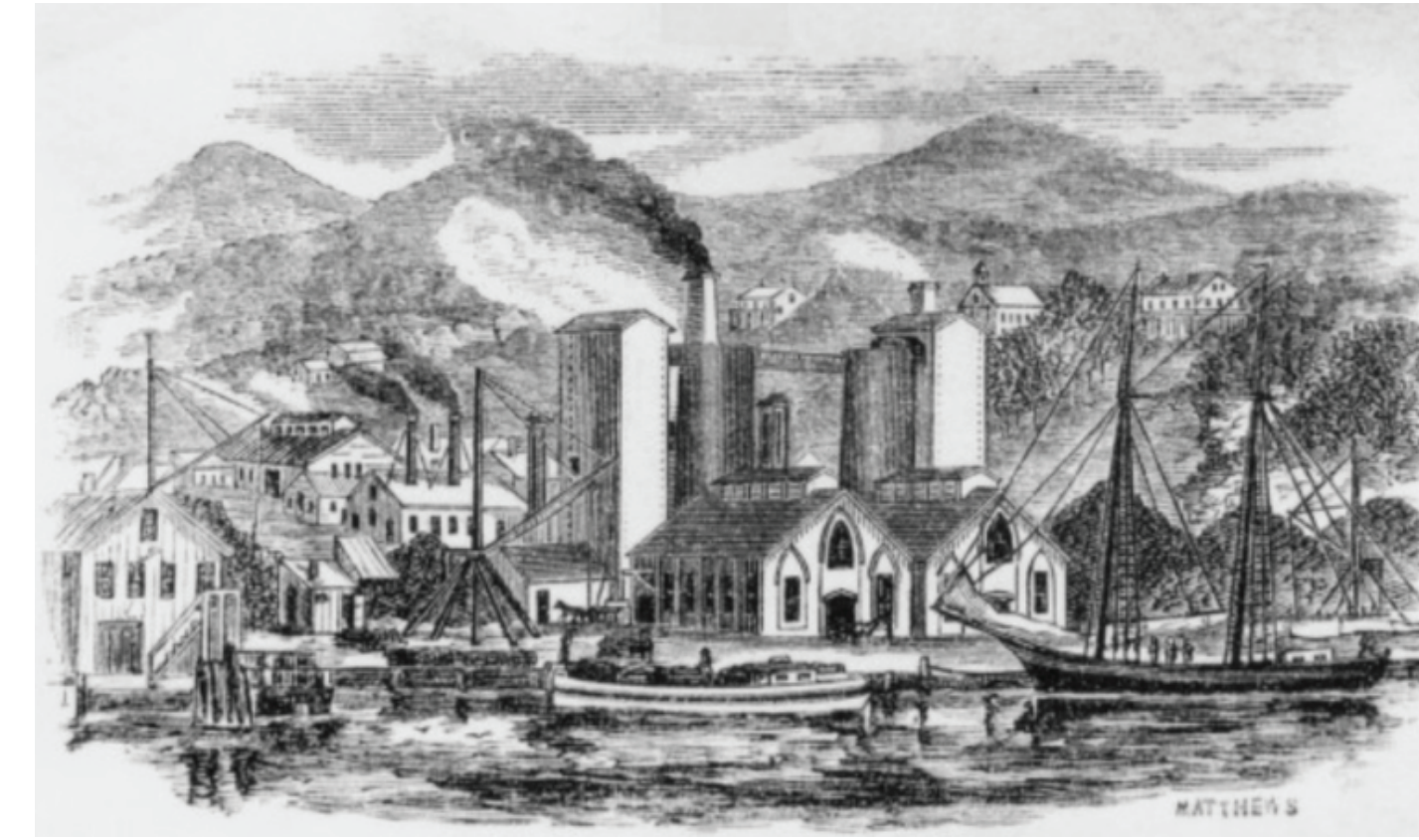


Figure 2 Showing the Bay State Iron Company's blast furnaces in Port Henry in 1847. (Taken from Hagley Digital Archives, digital.hagley.org).

Figure 3 Mine 21 at Mineville, the most productive mining site near Port Henry. These pits had not yet reached their full depth when this picture was taken just before the turn of the 20th century. (Taken from Kemp, 1897)

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The Witherbee-Sherman mining operation continued until the 1930’s when they gradually transferred their operations to Republic Steel mostly due to a lull in production due to the Great Depression. Republic Steel operated the mines as they developed steel during the second World War and throughout the 1950’s. However, during the 1960’s profit margins began slipping and the productive veins began getting so deep that they were inefficient to mine. Towards the last few years of mining in Port Henry, it would take workers one and a half to two hours to reach the surface of a mine at the end of their work day. This led to the final closure of the Port Henry, Moriah, Mineville and Witherbee mines in 1971. This is a date that locals from these towns know well because suddenly hundreds found themselves out of work and these towns found their economies would take a hard hit in the years to come. (Manchester, 2003).