

Hudson River Valley Icehouses and Ice Industry

An Introduction

The icehouses of the Hudson River Valley were a common sight in nineteenth-century New York. The icehouses were located along the middle and upper Hudson River, as well as on the various lakes located near the Hudson, and at times even the Hudson itself was used for natural ice harvesting. The ice industry lasted well over a century in the Hudson Valley. During that time, ice from the Hudson River was shipped to countries as far away as India. Most sources credit Frederick Tudor (see Photo 1) of Boston, Massachusetts, with the idea of creating large

commercially owned icehouses. Although small privately-owned icehouses existed at the time, the ice was not usually sold for profit. Tudor was the first person to ship naturally harvested ice outside the United States (Harris,



Photo 1
The Original Iceman: Frederick Tudor
Photo Credits: http://www.failuremag.com/arch_history_cool_customer.html

51). His success encouraged him and others to expand the ice trade industry. Domestically, the icehouses of the Hudson River Valley stored around three million tons of ice during the winter months by the end

of the United State's Civil War. The natural ice industry in the Hudson Valley, and the rest of the United States, eventually fell into decline during the pre-World War I years with the invention of manufactured ice.

The icehouses themselves were amazing feats of 19th century building technology. Some of the largest icehouses were able to store as much as 50,000 tons of ice (see Photo 2). Those along the Hudson River were often owned and operated by the large ice

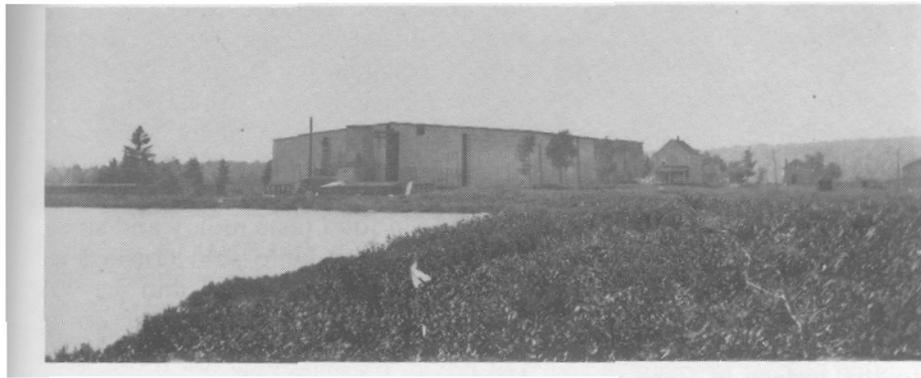
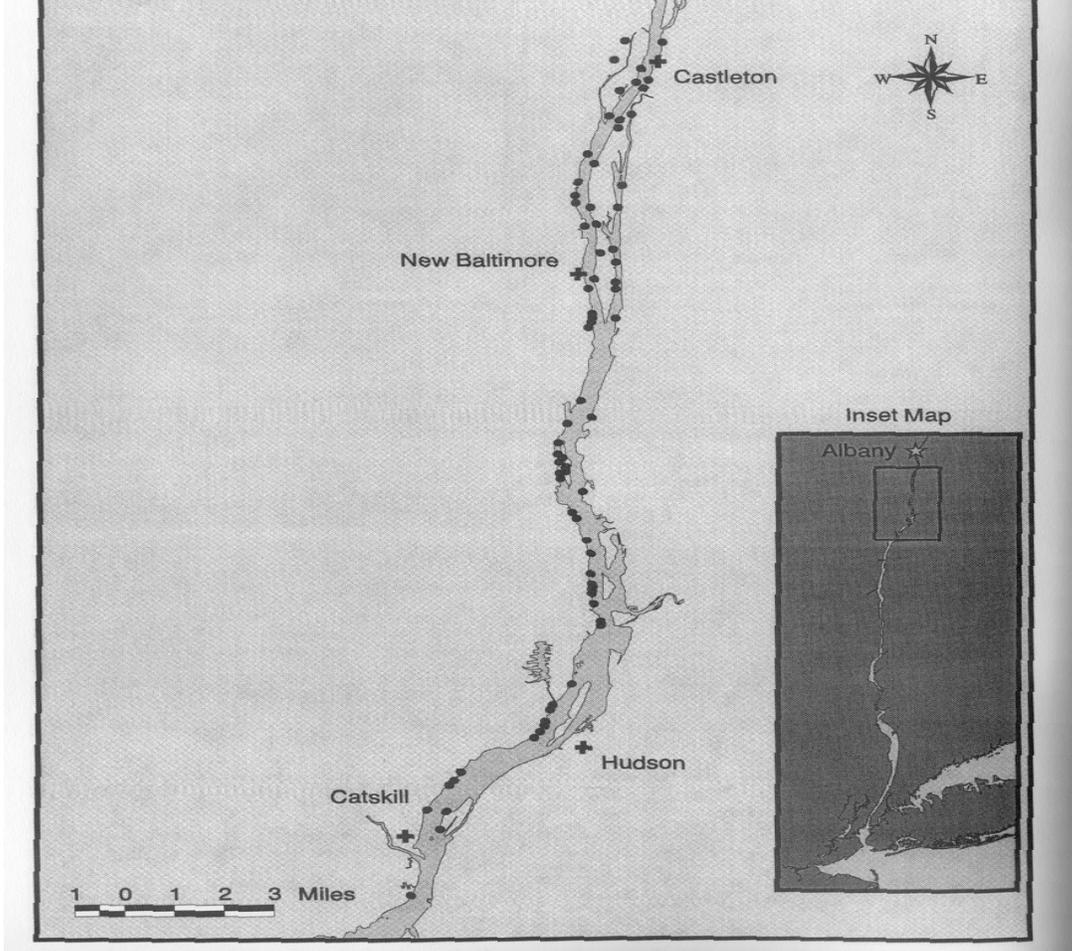


Photo 2
George Wood Company Icehouse of Utica, New York could hold up to 46,000 tons of ice.
Photo Credit: Ice Harvesting in Early America - Hill 5

companies of the day, Knickerbocker and Consumers Ice Company were two of the largest. Looking at the map provided by Wendy Elizabeth Harris in her article “Towards an Archaeology of the Hudson River Ice Harvesting Industry,” one observes that the majority of icehouses were located in upper Hudson River region, between the cities of Catskill and Albany (see Map1).



Map 1
 Location of Icehouses in the Hudson River Valley
 "Towards an Archaeology of the Hudson River Ice Harvesting Industry" - Harris 56

There were also icehouses located in the mid-Hudson River area as well, for example in Mills-Norrie State Park in Hyde Park. Further south in Rockland Lake, a large ice complex existed with its own small railroad able to move ice directly from the house to the rail yard (Living Valley Panoramas: Rockland Lake State Park, river front, 1).

The icehouses of the Hudson River region played an important role in the economic life of New York. Employing thousands of men in the Hudson Valley during the winter was only part of the economic power of the industry. Once the ice was delivered to distribution centers, companies then shipped directly to the residential customer or another industry. The larger ice companies also employed or contracted out their shipments. Boats and railways were used to move the stored ice from the icehouses to distribution centers in New York City. There some would go to consumers or would be

packed and shipped internationally, the Caribbean and India are two examples of overseas destinations. The Hudson River Valley ice industry was a powerful economic force in the Hudson River Valley , but was eventually made obsolete by the Industrial Revolution.

The Ice Industry in the Hudson River Valley

During the nineteenth century the icehouses located along the Hudson River, both privately and corporately owned, easily numbered in the hundreds. Harris, who authored two articles on the subject finds that one source states there were “approximately 135 major ice houses lined the river’s shorelines, inlets and islands between New York and Albany” (Harris, 1). As seen in Map 1, there was a large concentration of icehouses from the area of Catskill to just south of Albany. The opening of the Erie Canal enabled easier trade and greater access to markets in the western United States (Harris, 50). With New York City as its main hub, the Eerie Canal created a greater demand from New York City for fresh vegetables and from the West, New York City required fresh meat. The increased demand created a greater need for harvested natural ice. Map 2, from Harris’s article, shows Schodack-Houghtaling Island an island located in the Hudson River just south of Albany (Harris, 57). Only six and one half miles long the Schodack-Houghtaling Island contained approximately thirteen icehouse complexes (Harris, 57). As demand increased many of these icehouses were expanded so that more could be stored during the winter months.

Map 1, however, does not show the icehouses located to the West and South of the Hudson River. Towns such as Utica, New York had some of the largest icehouses in the United States (Hill, 5). In his book *Ice Harvesting in Early America*, Dewey Hill

provides some excellent photos of the large icehouse located in central New York. In Photo 2, the icehouse of the George Wood Company stored up to 46,000 tons of ice. Erected in 1911 this icehouse was one of the largest in New York (Hill, 5). Rockland Lake also provided a significant amount of ice to New York City due to its proximity. Still visible today are the ruins of the rail system that brought the ice from the harvesting and storage areas to the rail yard down below.

Ice Companies

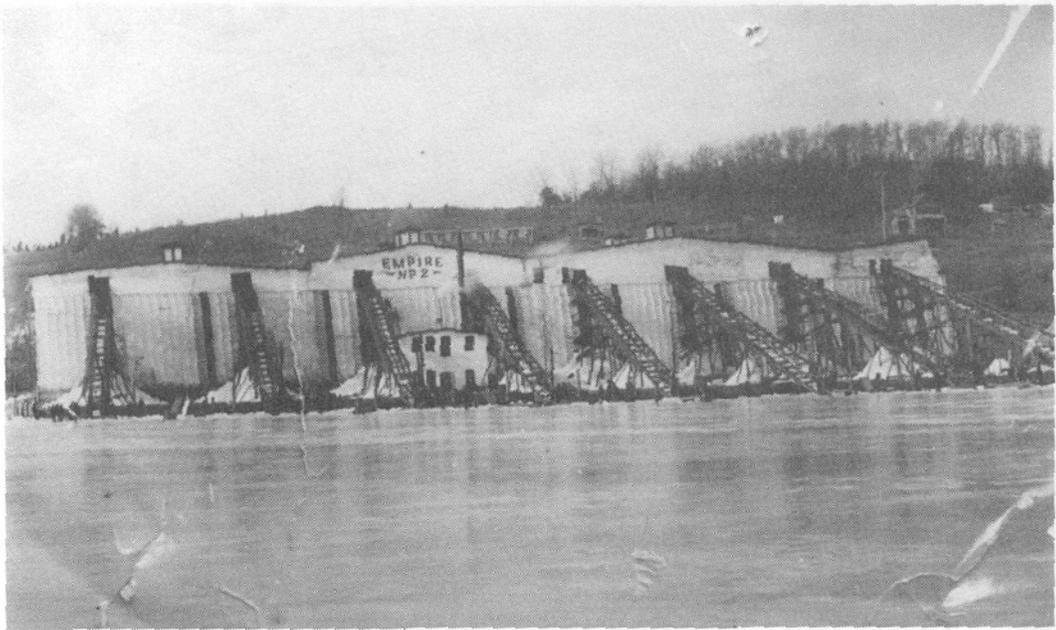


Photo 3
Empire Number 2 Icehouse Catskill, New York
Photo Credit: "Towards an Archaeology of the Hudson River Ice Harvesting Industry" - Harris 70

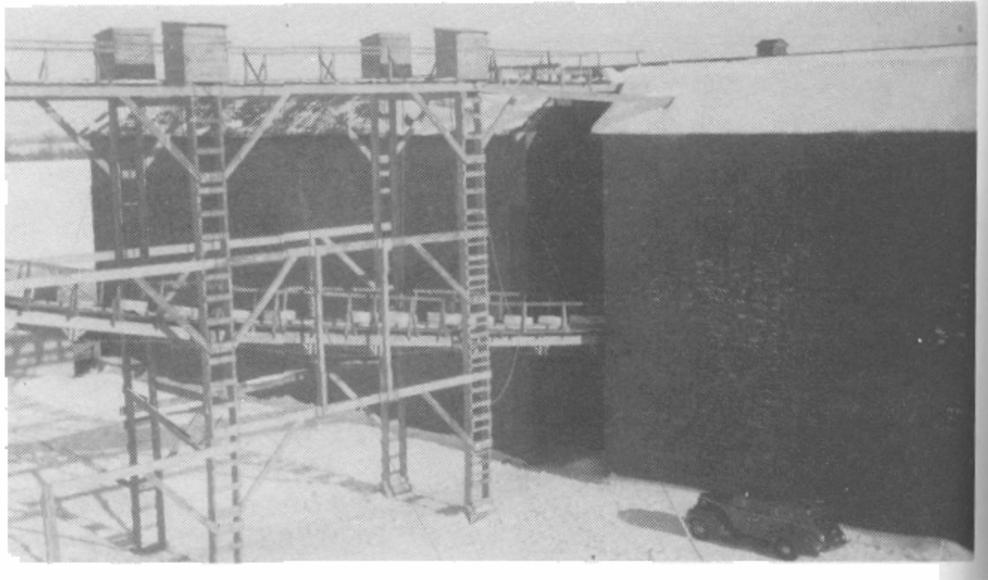


Photo 4
Utica Ice Company Icehouse, note the size of the car next to the icehouse.
Photo Credit: Ice Harvesting in Early America - Hill 16

The growing demand and profitability of selling naturally harvested ice created a great number of ice companies. The largest of which controlled several icehouses in addition to the means for transporting the ice to market and delivering it to consumers. Knickerbocker, American, Empire and National were all consolidations of smaller ice companies. Knickerbocker Ice Company was started when the numerous smaller ice companies around Rockland Lake consolidated (Harris, 51). Karthik Ramanan notes that, “The Knickerbocker Ice Company dominated the ice business. With many icehouses along the river, the company shipped ice blocks from ponds mainly to New York City” (Ramanan, 1). Eventually, Knickerbocker expanded outside of Rockland Lake and owned icehouses in Ulster, Dutchess, Greene, and Orange counties. Besides the major market of New York City, these ice companies sold their wares to rail companies to keep produce and meat cars cool. Additionally, ice was shipped domestically, southern ports such as New Orleans and Charleston, and internationally to India and the Caribbean. Moreover, as

the demand for ice increased so did the size of the icehouses as well as the number of companies to supply ice. Larger companies were able to operate sizable icehouses along the Hudson River. In Photo 3, an icehouse of the Empire Ice Company is shown.

Another example of the size of the icehouses can be found in Hill's book, *Ice Harvesting in Early America*, see Photo 4 (Hill, 16). The car parked next to the icehouse is telling of the building mammoth stature; while this particular business was located in Utica, many icehouses along the Hudson River were of similar size. The long conveyer systems seen here were used to move the ice from the river into the icehouse, varying from company to company and from location to location (Harris, 70). The Hudson River during the 1870s and 1880s saw the ice industry and icehouses increase in size as well as number. As previously stated, there were about thirteen icehouses on Schodack-Houghtaling Island. Through her own research and archeology Harris found that these icehouses were constructed in the late 1870s and early 1880s (Harris, 57). Provided is Harris's chart

(labeled here as Chart 1) from her article; this helps to demonstrate how the population increased in the 1880s affected the icehouses along the Hudson (Harris, 58). Both Icehouses B and C expanded significantly 1884 most likely to deal with the increased demand for natural ice. With the exception of Icehouse A all the Icehouses in the chart continued to expand all the way up until World War I.

As the population of New York City increased, the amount of iced shipped down river did as well. For example, in 1855, only 75,000 tons of ice was sold in New York City (*Ice Trade Journal* 1883b: 1). According to Harris’s article, “By the 1880s, this figure had reached approximately 2.5 million tons” (Harris, 51). It is this increased demand for natural ice that caused many ice companies, especially the largest ones, to

Chart 1

Table 1. Capacity of Houghtaling Island ice houses (tons).

Year	Ice House A	Ice House B	Ice House C
Hall [ca. 1881]	15000	10000	10000
1881	18000		
1882	18000	10000	11500
1883	18000	10000	11500
1884	18000	10000	11500
1885*	18000	20000	12500
1886	18000	21000	12500
1897	18444	31245	18000
1901	20000	41000	18500
	(or 15000)		
1905	15000	41000	27000
1910	14959	41662	28908
1915	14959	41662	28908

Sources: Hall 1884; *Ice Trade Journal* 1881, 1882a, 1883a, 1883b, 1884, 1885, 1886, 1897, 1901, and successor publications *Cold Storage and Ice Trade Journal* 1905, 1910; *Refrigerating World* 1915.

* 1885 figures for amount housed.

increase the size of their icehouses. Unfortunately for them, however, by the time the United States entered World War I the natural ice industry and its companies were slowly giving way to manufactured ice.

To understand the harvesting of natural ice one must first have information on the tools used to harvest ice.

Tools of the Trade

The great variety of tools and technology used to harvest natural ice evolved over time as new methods and technology became available. At first the tools were very basic man or horse pulled snow scrapers and saws, wooden planks (used to mark off the ice field), and long wooden poles with hooks attached at the end to guide the ice to the conveyer systems. The sleighs and cutting tools that were once horse drawn evolved into powered or steam driven cutters by the 1890s (Hill, 22).



Photo 5
A team clearing the ice field with a snow scraper.
Photo Credit: Ice Harvesting in Early America - Hill 10

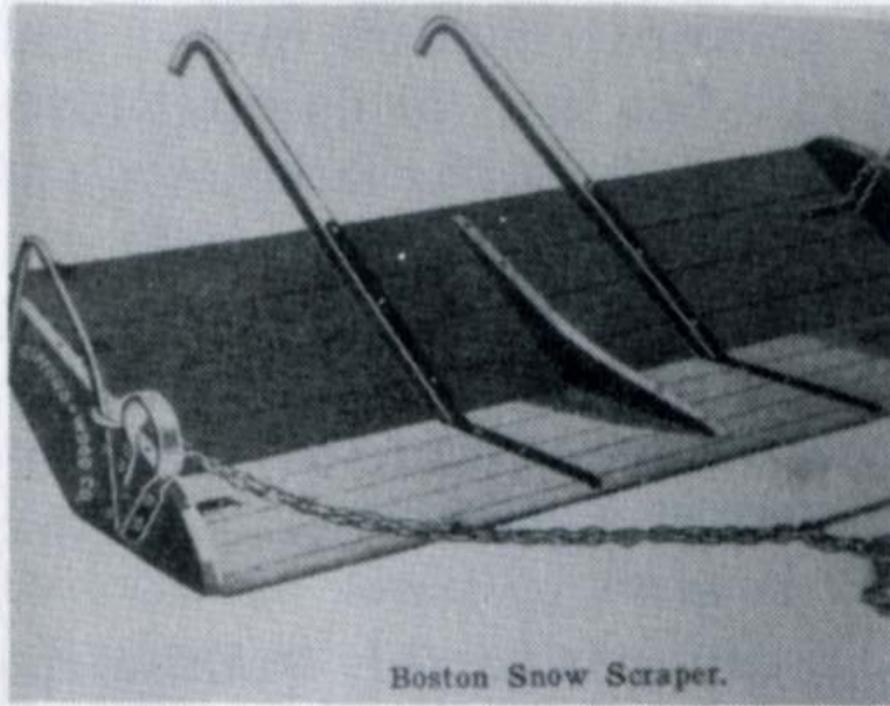


Photo 6
An example of the scraper used to remove snow from the ice.
Photo Credit: Ice Harvesting in Early America - Hill 12

Ice harvesting began in late January or February depending on weather conditions. The first task was to ensure that the ice was thick enough; according to Hill and Harris, the desired thickness was fourteen to sixteen inches thick (Harris, 54, Hill, 9). Depending on weather conditions the river or pond might not freeze until late January, meaning that harvesters would have to settle for ice that was only about eight to twelve inches thick. The harvesters called these “open winters,” which affected not only the thickness of the ice, but also the amount that could be harvested and sold (Keller, 151). Next, once the ice had reached its proper thickness, the snow needed to be scrapped off. This was done, as shown in Photo 5 and 6, by attaching a scraper to a team of horses. The scraper would then scrape the snow off of the river or pond (Hill, 10). Hill also explains the shine sleigh, which made sure the ice was clean by removing any impurities from the horses’ urine or feces (Hill, 11). The shine sleigh operator would use

formaldehyde to clean off the ice and place the urine or droppings into a waterproof sleigh.

Once the river or pond was cleared, the field was ready to be marked off. Holes were drilled about two-hundred feet apart to designate where cuts should be made. Then a plank with sights was used to line up a saw that would cut about half an inch deep into the ice in order to mark out lines (Hill, 13). This process was repeated until the entire field was sectioned off. After the field was prepared, horse-drawn cutters would be used to deepen the initial cuts in the ice (Harris, 54). In order to separate the ice completely handsaws were used, this process can be seen in Photo 7 (Harris, 54). Once this had been completed the ice could then be floated to the conveyer system. The “floats” was a term harvesters and cutters used to define a group of ice cakes that floated in the river or pond towards the conveyer.

The floats and ice cakes guided down to the conveyer systems were then loaded into the icehouse. A prying bar was used to prod the floats and cakes through the channels to the conveyer. An example of a channel and prying bar can be seen in Photo 8 (Harris, 55).



Photo 8
Hudson River ice crew near Catskill, New York.
Photo Credit: "Towards an Archaeology of the Hudson River Ice Harvesting Industry" - Harris 55

In her article, Harris described the processing of getting the ice from the river or pond into the icehouse itself.

The cakes were separated and guided by workers onto floating aprons at the shoreline. The aprons were connected to steam-powered elevators that hoisted cakes to sloping wooden 'runs' leading to narrow vertical doors extending the full height of the ice house (Harris, 54).

Hill also provides a photo of the channel leading up to the conveyer system which is labeled Photo 9 (Hill, 20).



Photo 9
Channel leading up to the conveyer system.
Photo Credit: Ice Harvesting in Early America - Hill 21

Depending on the house the method for filling the house was different. Large icehouses and companies used a steam-powered endless conveyer belt system. While small icehouses often lifted, through man or horse-power, the ice cakes directly into the icehouse. Often times large ice companies would plane down the cakes to a standard height and width so that the icehouse could be stocked more efficiently. The conveyer system can be seen in Photo 10 (Hill, 15).



Photo 10
Conveyer systems leading into icehouse.
Photo Credit: Ice Harvesting in Early America - Hill 16

While the conveyer system incorporating the planer can be seen in Photo 11 (Hill, 16).

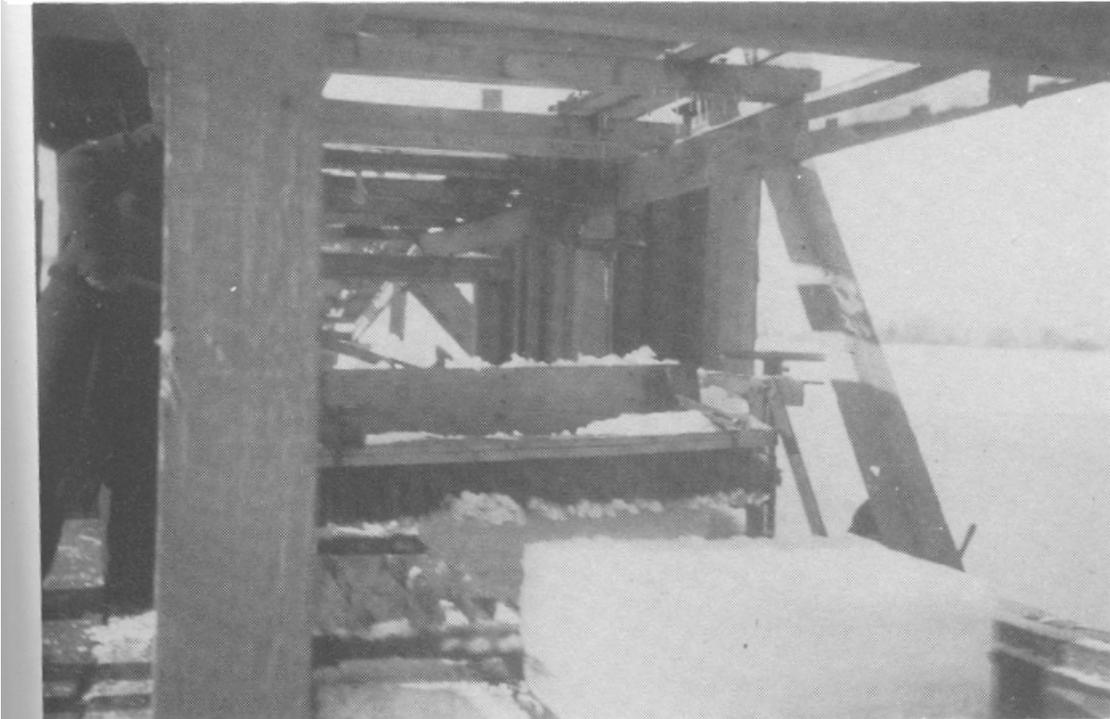


Photo 11
Ice planer and conveyer system.
Photo Credit: Ice Harvesting in Early America - Hill 15

Once the ice was cut and beginning to fill the icehouse, workers needed to prepare the icehouse for its winter and spring storage seasons.

The Icehouse, Storage, and Icehouse Sub-Systems

The ice, having been cut and moved on the conveyer into the icehouse, needed to be stored until the spring and summer months. The basic components of a Hudson River icehouse were: a wooden icehouse, an adjoining powerhouse, constructed of wood or brick, and an iron or brick chimney stack that could reach as high as fifty feet (Harris, 54). They were usually painted white or yellow in order to reflect the sun's rays and prevent melting. Size though varied, depending on the communities' or company's need and financial capabilities. Many farmers often had their own small icehouse for the purpose of preserving meat, produce, and butter. Conversely, Harris finds that some of the largest icehouses could measure up to 300 to 400 feet long, 100 feet in depth, and up

to three stories high (Harris, 54). Similarly, the storage capacity of icehouses differed greatly; some along the Hudson were able to hold up to 60,000 tons of ice (Harris, 54). The larger structures were designed specifically to keep ice from melting; most companies counted on at least a fifty-percent loss from harvest to delivery, but a well maintained icehouse could limit this to as little as twenty-percent (Keller, 151). The percentage lost could greatly affect the ice companies' consumer reputation since the customer paid by the pound of ice delivered. Companies therefore made sure their icehouses were properly insulated.

Besides being painted white, icehouses along the Hudson River were often double-walled. Between the two walls a variety of insulating material was used, including saw dust, wood shavings, or hay (Harris, 54). The insulation would prevent heat from getting into the icehouse, in effect to maintain the cool temperature inside. The ice itself was often packed in these materials to prevent further melting. Also, most of the Hudson River icehouses were initially made of wood. After the introduction of trains, however, the sparks from the rails could potentially ignite the icehouse as they were located close to train tracks in order to prevent further melting from storage to transportation (Hill, 25). Icehouses near the train tracks were then constructed from brick or tile to prevent fires. Inside the icehouse itself rooms were designed to limit the amount of air movement because dampness could lead to melting (Hill, 25). To additionally protect against these threats, the ice was placed from three to six inches off the ground with free drainage (Hill, 24). Besides the main icehouse, there were several sub-systems needed in order to maintain the icehouse and harvesting process.

Many icehouse complexes along the Hudson River contained the power sub-system. Through her research, Harris finds that the small stone structures located away from the main icehouse and ice field were used to power the conveyer system that fed into the icehouse (Harris, 66). The small powerhouses were often made of brick in order to prevent sparks from the fireboxes located within from reaching the wooden icehouse (Harris, 65). The powerhouse structures were located away from the icehouse to prevent melting as well. The heat produced from the powerhouse boilers and steam machine, however, afforded the ice workers a heated area in which to eat lunch and take breaks (Harris, 67). Harris also discovered, through her research and inspection of the powerhouses, that several contained small wells. These wells would have been used to retrieve water for the boilers when the machinery and piping could have become clogged with silt from the river water (Harris, 67). All the same, the labor force required to keep a Hudson River icehouse running was equally as important as the technology used to store and transport the ice.

The Icemen

The “icemen” who harvested the Hudson River Valley’s natural ice were only a small part of a much larger labor force. Besides cutting, the ice laborers were needed to move and transport the ice as well as deliver it to consumers. Those employed to harvest the ice often had different seasonal jobs as contract laborers (Harris, 52). Ice companies also required employees to load the ice onto the barges that would transport the product down-river (Harris, 52). Employing a substantial number of men, the jobs created by the Hudson River ice industry even helped other local business. The icemen spent their

wages at local shops, saloons, boardinghouses, and other retail establishments (Harris, 52).

The seasonal employment of the ice industry is estimated at about 20,000 employees (Harris, 51). The winter months required harvesters, cutters, storage personal, and other employees to man the icehouse and its power systems. The spring and summer months required transporting the ice (barges and various boats), maintaining the power sub-system, and delivering ice to the consumer. Year-round men were hired for the upkeep of the icehouse itself as well as any other secondary buildings. This could include the power generations system, caring for horses, and for some larger icehouses running the boardinghouses for the ice company's employees (Harris, 55). The result was a variety of employees that worked for the ice companies of the Hudson River.

Many employees of the Hudson River's ice companies were seasonal laborers. There were exceptions as some employees owned farms and property (Harris, 52). A few other employees had specific skills and could be employed for the entire year, some as engineers responsible for maintaining the power sub-system or carpenters responsible for maintaining the icehouse and ice company's boats (Harris 52). However, for many workers this type of seasonal employment was a key to their livelihood. Therefore, employees, often of different ethnic backgrounds, generally banded together in labor disputes.

Some of the employees of the Hudson River icehouses could not rely on their own farms and therefore needed better wages in the winter months. The long hours, dangerous working environment, and low temperatures was often compensated for by higher pay. There were, however, still labor disputes. As Harris finds in newspaper articles of the

period labor disputes often involved a variety of racial backgrounds (Harris, 53). The incorporation of wage labor often led to many of these disputes. For many of the workers this was their first experience with labor-management relations. Harris states that, “Thus, for farmers, artisans, and tradesmen listed Vanderpool, Van Orden, and Sherman payroll, life in the ice fields may have provided an initial personal encounter with labor strife” (Harris, 53). The wage labor system and various labor-management disputes reflect the changing environment in the Hudson River Valley. Here, the origins of typical problems of the industrial revolution can be seen.

Methods of Transportation

The ice companies had two methods of transporting the stored ice to their customers and industrial clientele. The first was via large transport barge sent down the Hudson River to New York City. This process also required smaller vessels to transport the ice from the icehouse to the shipping barges. The second method, less common method, was to directly load the ice onto railcars and ship the ice to its location via rail. This second method was less popular as most icehouses were not located close enough to railways make this a viable option.

The transport barges were the most common method used for shipping ice down the Hudson River. As most icehouses were located directly on the river this method was preferred because it prevented the ice from melting during transfer. Located nearest the icehouse was the wharf that created a three-sided enclosure so that the transport barges could load ice and dock (Harris, 71). Here, the smaller transfer vessels, referred to as “covered lighter” or “transfer barge”, would load ice for transfer to the larger barges waiting further offshore.

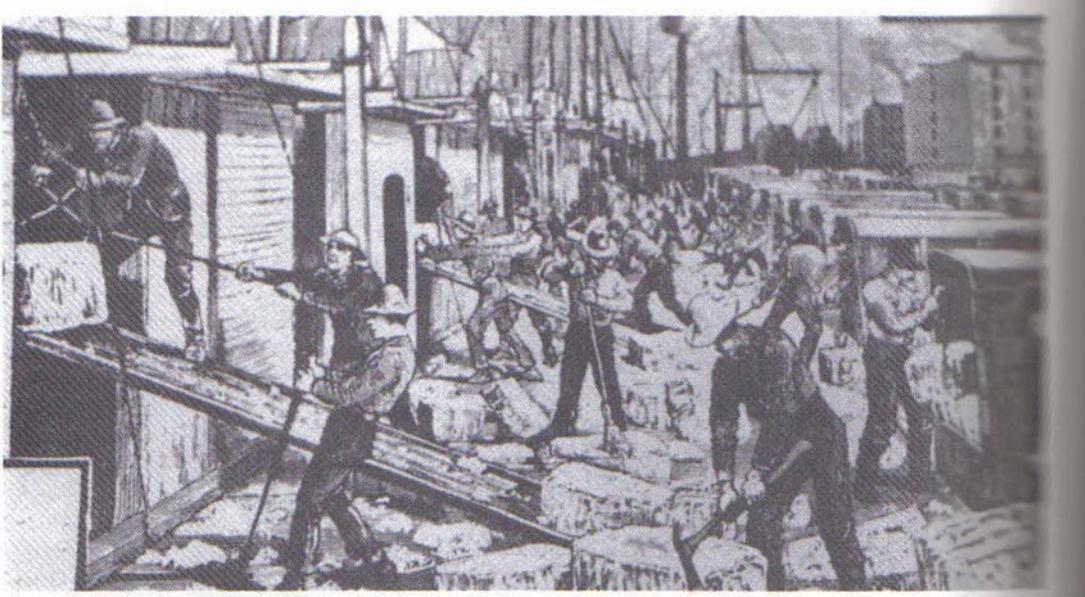
The larger barges that transported the ice down the Hudson to New York City were designed to operate in shallow water and had flat hulls (Harris, 72). When the barges were full they were pulled by tugboats down the Hudson to their destinations (Harris, 72). Harris estimates that the typical Hudson River ice barge could carry between 400-800 tons of ice (Harris, 72). The barges ranged in size from 110 feet to 140 long, 26 feet to 34 feet in length, and 9 feet to 10 feet in depth (Harris, 72). Depending on the size of the craft it could have from three to five masts that averaged about thirty feet (Harris, 72). The masts served a dual purpose since they were also used for the loading and unloading of ice (Harris, 72). Most barges were constructed of a white oak frame, yellow pine planking and decking, and white pine used for housing (Harris, 72). The barges were also designed to prevent the ice from melting during transport down the river.

The ice was stored below deck to prevent further melting. By keeping the ice as close to the water as possible, the cooler river water would retard further melting. If the ice could not be stored below decks, it was placed in “a long, double-walled and insulated deckhouse or cargo house” (Harris, 72). The storage area also contained bilge pumps powered by canvas-bladed windmills that were located on top of the deckhouse (Harris, 72). Besides the large ice barges there were also a significant number of coal barges near the icehouses. Coal was used to provide fuel for the power generation sub-systems.

Home Delivery

Besides shipping to industrial clients, the icehouses of the Hudson River also provided ice to home consumers. The majority home consumers were located in the New York City area. During the summer months, the ice barges would unload their cargo in depots at Manhattan, Brooklyn, and Yonkers (Harris, 74). An example of the unloading

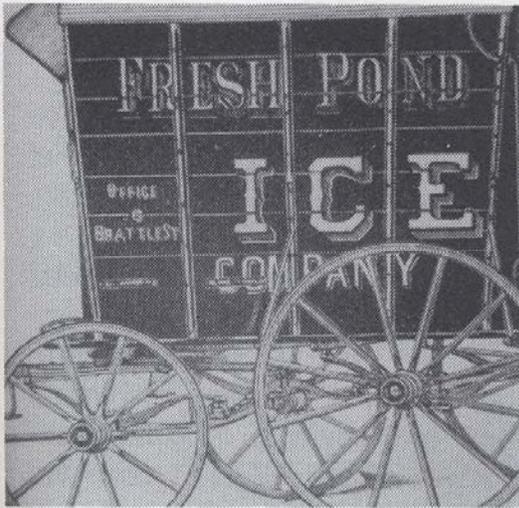
process can be seen in Photo 12 (Harris, 74).



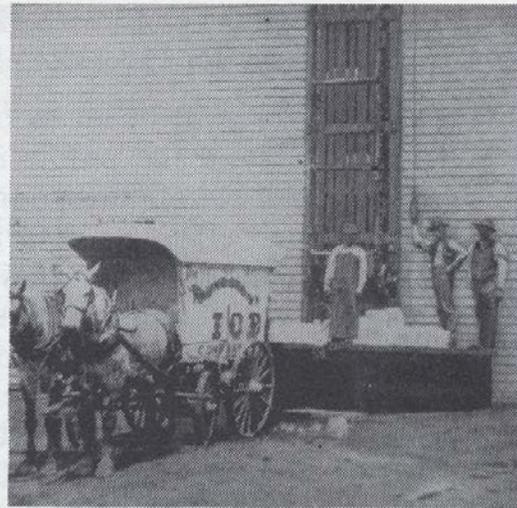
Unloading of the ice barges.
Photo Credit: "Towards an Archaeology of the Hudson River Ice Harvesting Industry" - Harris 74

After the ice was unloaded from the barges it was shipped to warehouses within the city itself. In the companies' warehouses, the ice was typically cut in 25, 50, and 100 pound blocks. The ice was then loaded onto the local companies' ice wagons for delivery to the home consumer.

Ice wagons were a common sight during the summers of the 19th century in many major American cities. An example of ice wagon from New York is show in Photo 13 (Hill, 30).



Examples of ice wagons from the state of New York
Photo Credit: Ice Harvesting in Early America - Hill 27



Until the invention and mass production of the internal combustion engine, the horse-drawn wagon was used to deliver the cut natural ice to consumers. The typical ice delivery man was well built from having to carry the heavy blocks of ice on his back all day. Often the iceman had no other tools than a leather pad, placed over his back when carrying ice, and a pair of ice tongs, used to hold the ice. A card, shown in Photo 14, placed in the home's window indicated how many pounds of ice the family wanted delivered that week (Hill, 27).

The iceman would then place the desired amount of ice in the icebox, usually located in the kitchen. Until the invention of the refrigerator and the freezer, this process continued unchanged for several decades.

The Coming of Revolution and the End of an Era

The methods, equipment, and storage of the natural ice industry in the Hudson River Valley had remained untouched since colonial days. That changed suddenly just prior to World War I when the industrial revolution changed nearly every aspect of American lives. At first, the natural ice industry adapted by using steam-powered ice cutters and trucks to harvest and deliver ice. Later, however, with the introduction of industrial cooling and cooling coils, the need for natural ice diminished. As these



technologies became smaller and smaller they were implemented into the refrigerator. After the invention and widespread use of the refrigerator, the freezer was invented. Initially, the freezer was a large, short bin placed on the floor and was separate from the refrigerator. Eventually, as the cooling and freezing components became smaller and more powerful the freezer was placed with the refrigerator.

By the time of World War I, the

natural ice industry was all but extinct. After World War I, it ceased to exist. Most icehouses were destroyed, their parts used for scrap or recycled. Other icehouses, as well as some of the powerhouses and subsystems, were simply abandoned at their locations. Harris's study noted the archaeological remains of icehouses, powerhouses, and boats along the Hudson River.

The natural ice industry of the Hudson River Valley was a powerful industry in the Hudson Valley until World War I. Along with other industries, such as the brick and whaling industries, it created a "corridor of commerce" along the Hudson River. The product provided by the natural ice industry was invaluable not just to the home consumer, but also for commercial industries. Hudson River icehouses shipped ice not just to New York City but all over the world. As Henry David Thoreau said in *Walden*,

“Thus it appears that the sweltering inhabitants of Charleston and New Orleans, of Madras and Bombay and Calcutta, drink at my well”.

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