

On the Shores of Lake Dunmore

Glassmaking in the 19th Century Champlain Valley

How was glass made in the 1800's? What was the geological source of silica, and why did the industry start up in Salisbury, Vermont?

The Vermont Glass Factory - A Brief History

Vermont's glassmaking industry started in 1812 with the Vermont Glass Factory, a small window glass-making company built on the northern shore of Lake Dunmore in Salisbury, Vermont (See Figure 1). It could easily be said that Vermont's glassmaking history was set into motion by the War of 1812, when a trade embargo was placed on imported goods, blocking much of the New World's access to such commodities as imported window glass (Heidler 1994). As Vermont developed, with a growing population and growing prosperity, board houses rapidly replaced simpler timber houses, and, with limited transportation (railroads had not yet arrived in Vermont), there was a steadily growing need for locally made window glass in the early 19th century, where there had been none before (Basic Antiques). Though promising at the start, Vermont's first glassmaking factory attempt was quite short-lived – in 1949, industry gave way to summer recreation when the Lake Dunmore Hotel Company purchased the glass factory and all of its property (Basic Antiques). Despite this fact, The glass making industry in 19th century Vermont provided an essential product for the inhabitants of the Champlain Valley while it was running, and many examples of the Vermont Glass Factory's glass survive today in private and public collections.

The Cylinder Method

In the 19th century, nearly all glass products were made by hand through a process of glassblowing.

The glass making starts with washing and sifting the sand. Next, it was taken to the furnace room, where it was put into clay pots and slowly melted at a high temperature, producing molten glass, or "metal". When the glass was cool enough to be worked, the glass blowers were called (Carlisle 2000). At the Vermont Glass Factory, glass blowers would have used the cylinder method to make their glass (Basic Antiques).

The Vermont Glass Factory used the cylinder method to make their window glass. This method starts out with a long, blown glass cylinder, five to eight feet long and around a foot in diameter. The cylinders were made so large by being swung over a trench, with the worker leaning over a suspended platform, and then widened by a second worker. Next, the end cap of the cylinder was removed, as well as the pipe end, and allowed to cool some. The glass cylinder was then split lengthwise, and the glass laid in a "sagging kiln," where it was allowed to anneal slowly and settle to the form of a large rectangular piece of glass (Firth 2011). Annealing involves the slow cooling of a completed glass object in the furnace, so that it is not allowed to cool too quickly, which can result in easily breakable, highly strained glass (Pocket Dictionary). The cylinder method is illustrated in Figure 2.

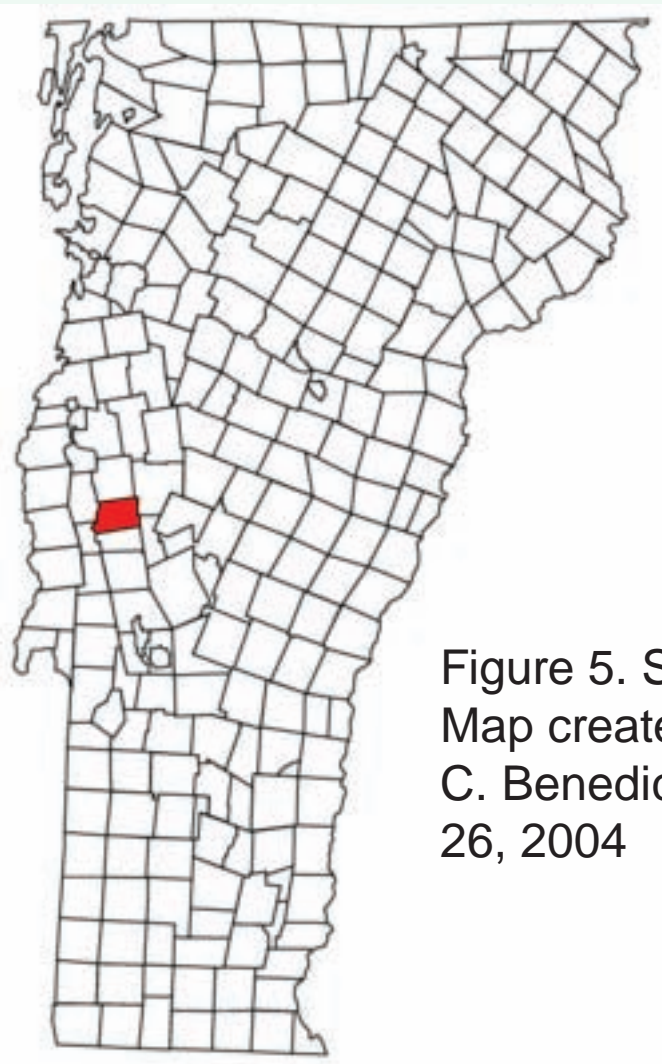


Figure 5. Salisbury, VT. Map created by Jared C. Benedict on March 26, 2004



Figure 4. Vermont's quartzite (and therefore silica)-rich sand. From <scienceofsand.info/sand/vt.htm>.

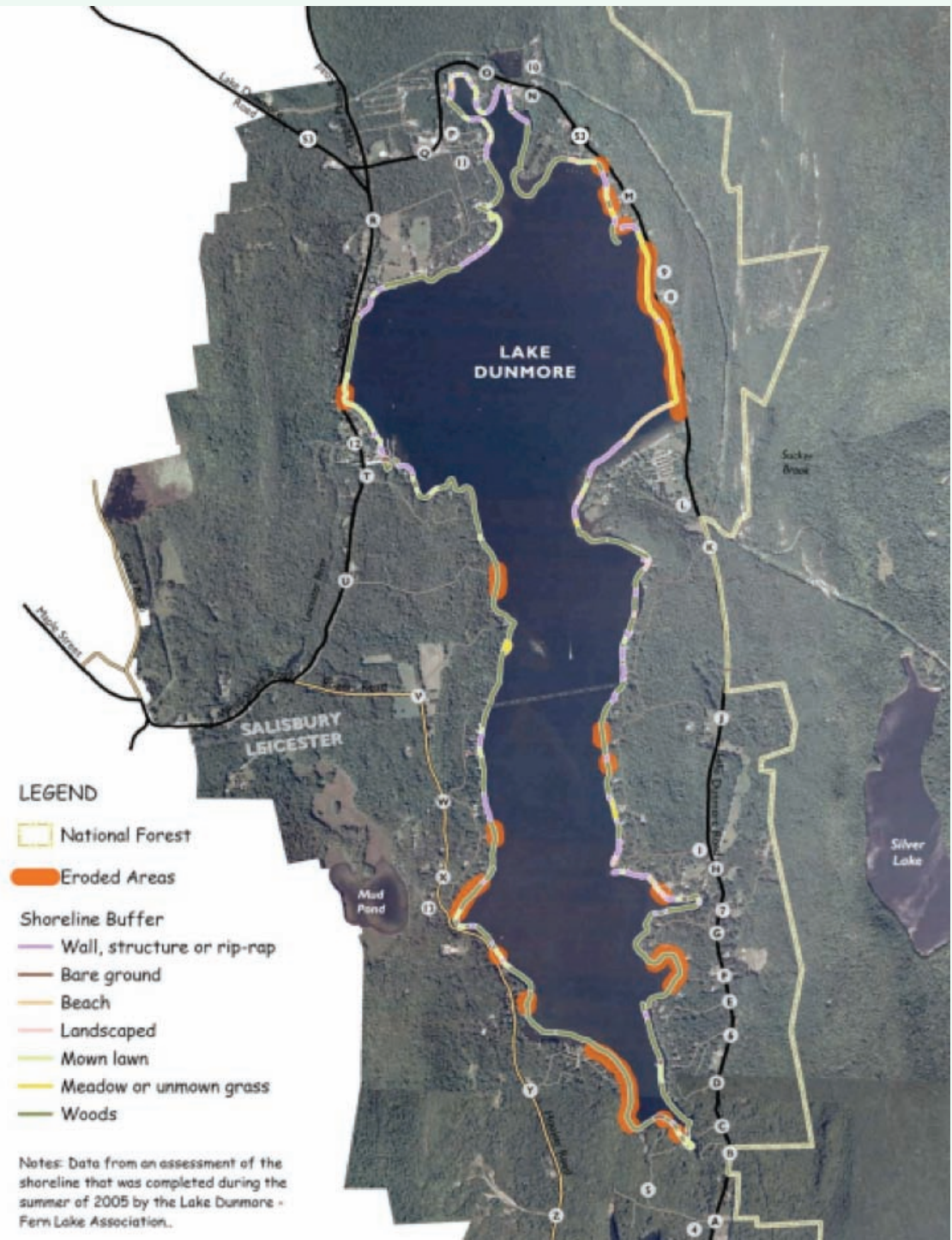


Figure 3. Satellite map of Lake Dunmore, showing the composition of its shoreline. Beaches are marked with a peach color. Notably, there is a small amount of beach where the glass factory used to stand. From Ezerman, Robert. "Lake Dunmore - Fern Lake: Salisbury - Leicester Collaborative Planning Study," 2005

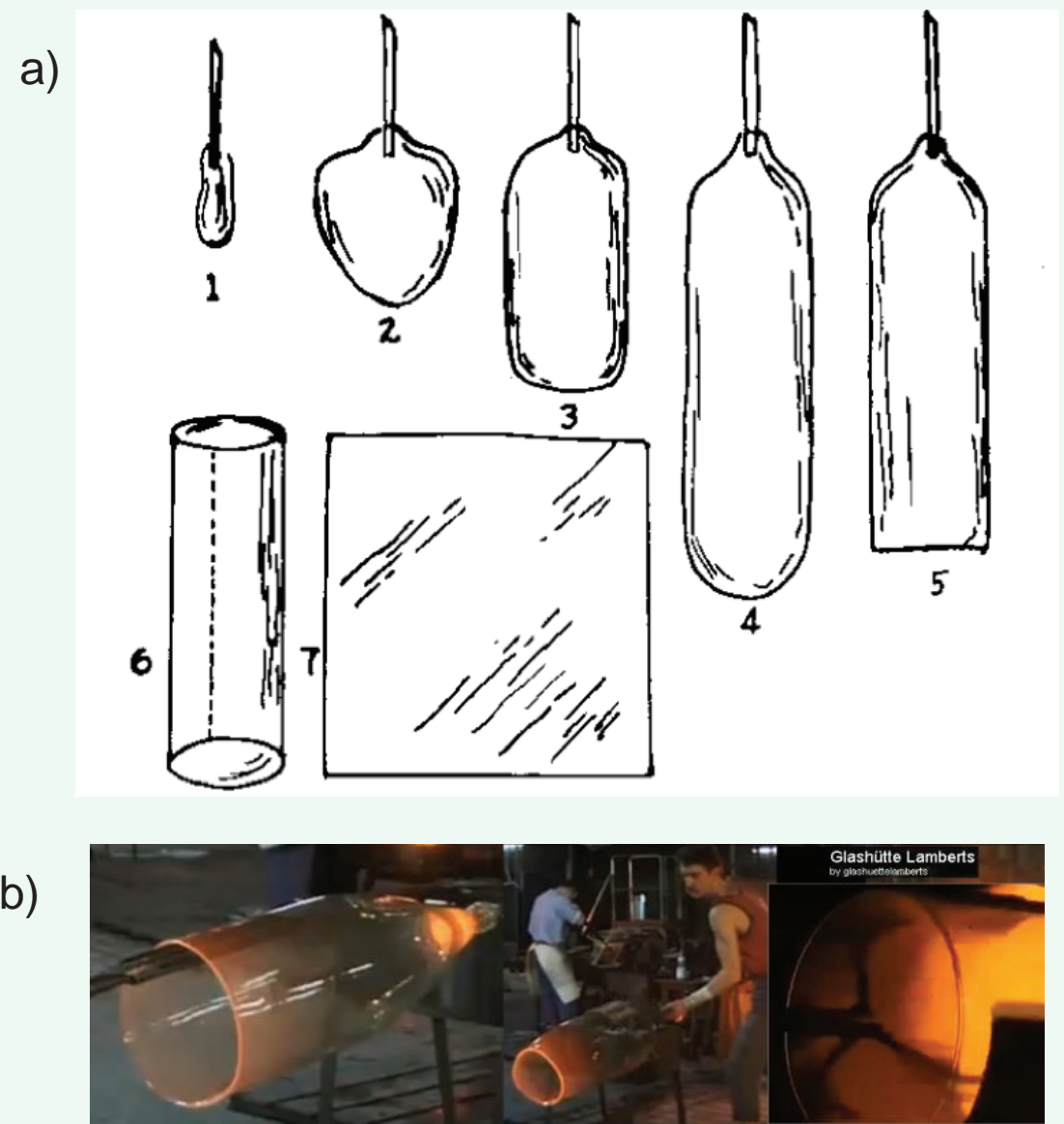


Figure 2. a) Steps in the process of making sheet glass by the cylinder method. A cylinder about five feet long and one foot in diameter was blown and the ends cut off. Then, the cylinder was slit and opened out into a flat sheet.

b) Widening the glass cylinder. Both photos from Firth, "Making Tubes & Sheets of Glass," 2009

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Dunmore's Resources and the Resulting Appeal

Located in the southeastern part of Salisbury and covering an estimated 1400 acres, Lake Dunmore has long been "that spot most sought by those who 'hold communion with nature's visible forms,'" (Weeks, 1860) proven in the summer cottages and renowned boys' and girls' camps Keewaydin and Songadeewin that line the shores of the lake today. One can only imagine the lure of such pristine beauty that must have existed at Lake Dunmore in the early 19th century, with its picturesque mountains and clear water. Even more tempting to investors, however, were the readily available resources for a successful glass making company.

Glass is made of a combination of materials melted together, then cooled rapidly before they are able to crystallize. Predominantly, glass is made of silica in the form of sand, flints, quartz, or recycled glass – though it is not for certain, it can be assumed that glass at the Vermont Glass Factory would have been made mostly of sand, because Lake Dunmore had sand in large quantities along its shore; even today, summer visitors are tempted with promises of 1,000 feet of beaches (See Figure 3). Vermont's quartzite-rich sands (see Figure 4) would have provided the silica needed to make glass. Carlisle also points out that silica was "readily obtainable in the 'sandy and light' soil of northeastern Vermont," and that deltas in South Burlington and Colchester held sand, making it relatively economical to obtain in the area (Carlisle 2000). This was, perhaps, the factor of Dunmore's geology that was the most luring to glass investors at the time.

Debatably more important to the glassmaking process than sand was the availability of wood to burn. Wood was essential because a vast amount of it was needed to keep the furnaces at a temperature hot enough to fuse the glass. Potash, a product of wood, was also necessary, and used as an alkali to help fuse the glass' materials. The glass factory could obtain potash from farmers (who often made potash in the process of burning down forests to clear their fields) (Carlisle 2000), but the thick forests of the mountainous area surrounding Lake Dunmore and Salisbury were also readily available to be turned into potash or used as fuel, adding to the list of reasons that the factory was located at Lake Dunmore (Weeks 1860).

Lime, derived from limestone, was used in the glassmaking process to "render the glass less brittle, and enable it to withstand better the action of the atmosphere." (Household Cyclopaedia, 1881). Limestone was, and is still, very abundant in the Salisbury area, and indeed throughout Vermont, on account of ancient geological movement in the Champlain Valley (Doolan 1996). As another virtually inexhaustible resource, the abundance of limestone contributed to the positioning of the Vermont Glass Factory.

Lake Dunmore was also an ideal location for the glass factory because of the possibilities it presented for transportation. One historical account stresses the importance of this advantage by assuring readers that "one of the five principal roads that crossed the Green Mountains ran directly through [Salisbury]. Could there be a better place for a glass company which sold its products on both east and west sides of Vermont and even penetrated as far down the Connecticut Valley as Hartford?" (Basic Antiques). Before railroads reached Vermont, transporting glass would have been very slow and tedious without the proximity of a major road, especially when Lake Champlain, the 19th century equivalent to a highway, was not close by. Thus, it was crucial for the glass factory to be placed where transport was relatively easy.

Henry R. Schoolcraft can be quoted praising Dunmore's geological perfection and the certain success of a glass factory in an article which appeared in December, 1813, in the Literary and Philosophical Repository:

"Sand is found on the shores of the lake. Wood stands in exhaustless abundance in the immediate vicinity of the Factory. Fire-stone, an article hitherto brought, at great expense, from Connecticut, has been discovered within ten miles of the works. ... From the unusual success that has attended these works since their commencement, the many advantages which they hold and the variety of the materials with which the place abounds for the making of all kinds of glass, we are led to believe, they will become one of the first establishments in the union." (Basic Antiques).