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Queen of the Lakes

Mark L. Thompson

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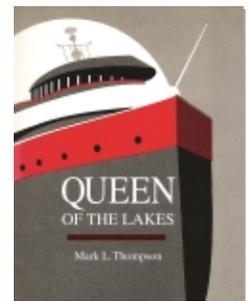
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1

An Iron Queen

February is usually a harsh, unfriendly month in Cleveland. Most who have endured even one of the long winters there will tell you that by February their minds begin to play tricks on them. After months of lifeless grey skies, interminable snow, biting winds, and frigid temperatures, it seems to many that through some ghastly quirk of nature winter has become a permanent condition. It's no wonder that residents tend to be reclusive in February, limiting their excursions out-of-doors to the bare minimum.

It was relatively unusual, then, to find a large crowd of Cleveland citizens gathered along the old river bed at the foot of Taylor Street on the morning of February 16, 1882. Bundled against the frigid winds that rushed up the Cuyahoga River off Lake Erie, they had crowded into the new Globe Shipbuilding yard to witness the launching of the *Str. Onoko*. The first iron-hulled bulk freighter ever built at Cleveland, the *Onoko* would on that day also become the longest and largest ship on the Great Lakes.

Prominent among the throngs of spectators was shipyard superintendent John Smith, who had personally overseen construction of the remarkable new vessel. Smith, a native of Wales who had developed a reputation for working with iron while employed by the Grand Trunk Railroad, was almost oblivious to the cold as he basked in the many gestures of praise from attending officials of Globe Iron Works,

the shipyard's parent corporation. Globe had gambled both its reputation and financial solvency to build the new freighter, investing heavily in the new shipyard and convincing one of the leading shipowners on the lakes that an iron-hulled ship would be superior to those built of wood.

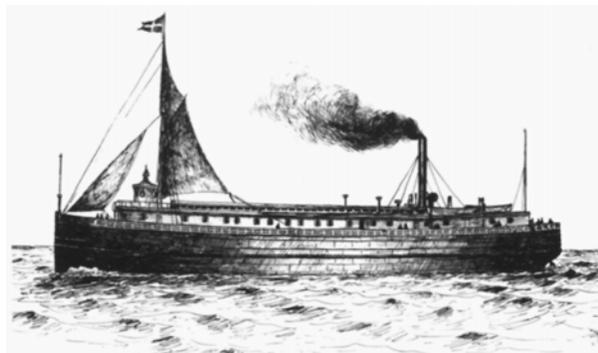
Construction had gone remarkably smoothly, but as the huge ship sat poised on her ways Globe officials remained uncertain as to how she would actually perform. Iron had been used in ship construction since 1822 when the little *Aaron Manby* had been built at the Surrey Commercial Docks on the Thames in England for service on France's River Seine. The U.S. Navy had pioneered iron shipbuilding on the lakes in 1843, when the steamer *Michigan* was launched at Erie, Pennsylvania. She was the first iron vessel built by the Navy, as well as the first iron ship on the lakes.¹

The 163-foot *Michigan* was still operating almost forty years later, which had to be reassuring to the people from Globe, but some of them were no doubt aware of the embarrassing circumstances of the naval ship's send off. If so, it's likely that they were praying silently that those events would not be repeated that day. The launching of the *Michigan* had attracted an equally large crowd, many certain that the unusual iron ship would never float. The atmosphere was tense as the timbers that held the ship were removed and she began to slide slowly down her ways toward the water. Then, in an instant

that would forever be frozen in the memories of shipyard officials, she ground to a halt. The repeated, strenuous efforts of the yard's workers failed to dislodge the ship from her perch. After awhile, the throngs of disappointed onlookers disbanded. Even the frustrated shipyard staff went home, and the *Michigan* sat abandoned on her ways. How surprised and delighted the workers must have been the next morning, when upon their arrival at the shipyard they found the *Michigan* floating buoyantly alongside her now-vacant ways. During the night the stalwart little ship had launched herself and was even then proving all her skeptics wrong. Not only did the iron ship float, but over the years she proved to be an able and seaworthy vessel.²

The first iron-hulled commercial vessel built on the lakes was the *Merchant*. She was launched in 1861, twenty years before the *Onoko*, for the Erie and Western Transit Company's Anchor Line. A propeller-driven steamer of 200 feet in length and 700 tons,³ she operated on the fleet's passenger and freight routes between Buffalo and Chicago.⁴

Despite the success of the *Michigan* and *Merchant*, in the third quarter of the nineteenth century wood remained the building material of choice on the lakes. It was plentiful, it was inexpensive, and, even more importantly, it was a material that shipbuilders and shipowners were familiar with. The fabrication of iron ships required shipbuilders to abandon their comfortably familiar and time-tested construction techniques. To build with iron, they needed to develop new procedures and tools and retrain their workers, who were already masters at building with wood.



A Stanton drawing of the iron-hulled *Merchant* with its auxiliary sails set. The first commercial vessel on the Great Lakes built with an iron hull, the *Merchant* was launched in 1861 for the famed Anchor Line of the Erie & Western Transit Company. Despite the success of the *Merchant*, wood remained the preferred building material on the lakes until the 1880s. (Author's collection)

For shipowners contemplating the purchase of iron vessels, the shift to iron represented not just an acceptance of the obvious problems arising from the use of a new building material, but the assumption of certain risks as well. They knew that the iron ships would cost far more to build than wooden vessels, but they had no body of statistical evidence to insure that the iron ships would be sufficiently more durable to justify the increased outlay. In fact, shipowners were aware that insurance underwriters felt that after five years of service an iron hull was a poor insurance risk.

Despite the inherent uncertainties, the Detroit Dry Dock Company had begun building commercial iron vessels at their shipyard at Wyandotte, Michigan, in 1873. They turned out a number of iron sidewheel passenger steamers,⁵ an iron tug, two iron car ferries, two iron package freighters, and even an iron-hulled steam yacht, all before 1880. In 1877, attempting to placate the skeptical insurance underwriters, they built the passenger steamer *City of Detroit* with a composite iron and wood hull. Marine insurers thought the iron hull plates were brittle and would shatter and break if a ship built with them ever grounded—a common occurrence on the lakes at that time. An acceptable compromise was reached with composite hulls, which had a layer of oak planking to protect the iron plates below the waterline. Detroit Dry Dock continued to build composite hulls through at least 1890, although shipyard officials felt that the oak sheathing was unnecessary.

In 1881, Detroit Dry Dock turned out the first iron-hulled bulk freighter on the Great Lakes, the *Brunswick*. She was 235 feet long at her waterline, with a beam of 35 feet, 6 inches, a depth of 15 feet, 6 inches, and measured at 1,120 gross tons. Just slightly larger than the 1869-built, wood-hulled *R. J. Hackett*, after which she was modelled, the landmark vessel had a short life on the lakes and is today virtually forgotten by historians. Launched on May 21, 1881, for Charles Bewick of Detroit, the *Brunswick* was involved in a collision with the schooner *Carlingsford* off Dunkirk, New York, on November 12 of that same year, while westbound with a load of coal from Buffalo. After less than a season on the lakes, she sank to the bottom of Lake Erie, and into obscurity, taking four of her crewmembers with her.⁶ Many pointed to the loss of the *Brunswick* as irrefutable evidence that iron ships were inherently unsafe.

By the time news reached Cleveland of the sinking of the *Brunswick*, the iron freighter that had been ordered by Philip Minch was already nearing completion at the Globe shipyard. While the investors who had helped finance the new ship were alarmed by the news, Minch assuaged their fears by assuring them that the *Onoko* would generate handsome profits for them. On that cold February morning when the new vessel was

finally prepared for launching, however, even Minch probably had some doubts as to whether it would live up to his expectations.

STR. ONOKO

302'x38'8"x20'7"

Queen of the Lakes

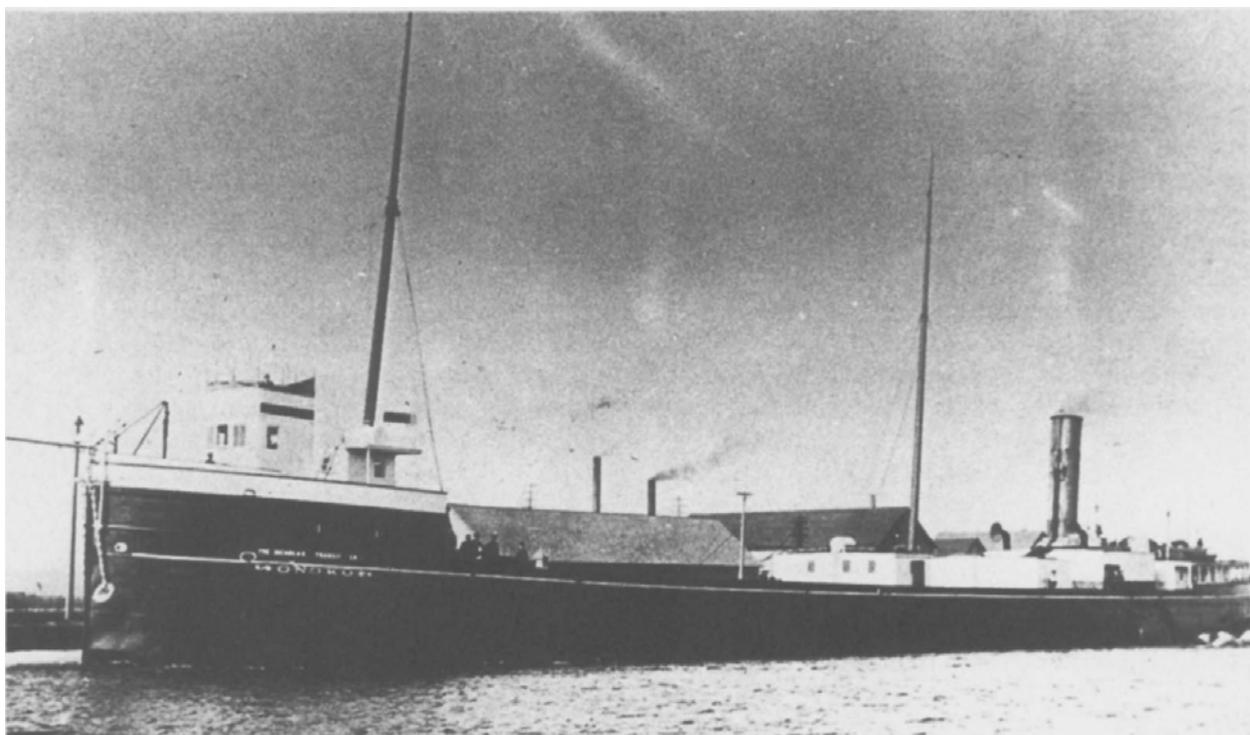
February 16, 1882 to September 4, 1886⁷

Any reservations he had were undoubtedly forgotten when the mammoth freighter finally slid from its ways into the cold waters of the Cuyahoga amidst an appropriately boisterous roar from the crowd of onlookers. Christened *Onoko* after an Iroquois chieftain, the new ship had looked slightly ungainly when it had been cradled on the ways, but once in the water it took on a totally new appearance, and one that pleased Minch's trained eye.

Onoko was dramatically larger than the wooden bulk freighters that yards had turned out in recent years. Her deck stretched longer than a football field—302 feet, 6 inches—and with a beam of 38 feet, 8 inches and a depth of 20 feet, 7 inches, she measured at a whopping 2,164 gross tons. Her 900-horsepower, fore-and-aft compound engine also made her one of the most powerful ships on the lakes. To provide auxiliary power, she was fully rigged as a three-masted schooner.

Looking on proudly as the *Onoko* bobbed on the waters of the Cuyahoga, Minch knew intuitively that the iron ship would be a good carrier. It was clearly descended from the design pioneered by Eli Peck when he built the *R. J. Hackett*, although many people would later point to Minch's ship as "the true prototype of the modern lake vessels."⁸ With her pilot-house forward, her engine aft, and a long, uncluttered deck in between, Minch was confident the *Onoko*'s boxy hull would soon carry record cargoes of iron ore. To him, she represented the perfection of the shipbuilding art and was fully deserving of the title Queen of the Lakes.

The iron-hulled *Onoko* in the latter part of her career. Two of the ship's four original masts have been removed and two "doghouse" cabins built on deck to house added crewmembers. (Institute for Great Lakes Research, Bowling Green State University)



Minch must have been devastated in succeeding days when he heard his marvelous new ship referred to disparagingly as “a monstrosity,”⁹ a “floating boot box,”¹⁰ and a “monster floating warehouse.”¹¹ On each visit he made to Globe during the balance of the winter, the former shoemaker studied the *Onoko* critically as she lay inert at her fitout dock. Regardless of what others were saying, she looked beautiful to him. Her iron hull was painted black, not a particularly pretty color, but it had been capped with an attractive white band that ran from bow to stern. At her bow, the *Onoko* had a raised forecastle deck containing quarters for the deck crew. Atop the forecastle deck was a cabin for the captain and deck officers, set back as far as possible from the bow. On top of the cabin was the wheelhouse. It was smaller than the cabin below it, so a walkway was formed all the way around the wheelhouse for use by the captain and mates who navigated the ship. An even better vantage point could be had by climbing to the top of the wheelhouse, where a railing enclosed the ship’s “flying bridge.” It was from the flying bridge that the deck officers would most often navigate the ship, calling their instructions down to the wheelsman in the wheelhouse below them.

The forward superstructure was painted white, as was the large cabin at the stern containing the galley and quarters for engine room personnel. The long deck in between was broken only by the eight hatches through which the ship would load cargo and the four tall masts that were spaced evenly down the deck. The masts and the tall black smokestack that towered above the after cabin were all slightly raked backward: Minch thought they created an illusion of speed even when the ship was tied to its dock.

With little need for auxiliary sail power, the *Onoko*’s two center masts were eventually eliminated and her remaining fore and aft masts were reduced in height. When the traditional two-watch system was replaced by a three-watch system, an additional small, rectangular cabin, or “doghouse,” was constructed on her deck amidships to accommodate the additional crewmembers.

Although many other shipowners ridiculed Minch for building an iron ship, he was clearly vindicated by the record established by the *Onoko* over the next three decades. By 1899, she was being referred to as “one of the most remarkable steamers on the lakes.”¹² In ten of her first sixteen years of service, she carried the largest cargoes of any boat on freshwater “and [had] earned money enough to load her down.”¹³ Before the end of the century, the *Onoko* set records for iron ore, wheat, and corn, then broke her own records on subsequent trips. She could carry 3,073 tons of ore, or about 110,000 bushels of wheat or corn, and her powerful engine made it possible for her to tow a barge consort that added to her per-trip carrying capacity. At \$3 a ton for ore and 14-cents a bushel for

grains, Minch and his investors could afford to smile at those who still found fault with the *Onoko*’s appearance. Convinced of the future of iron freighters, Minch’s group contracted with Globe in 1884 for the construction of the *William Chisholm*, and in 1885 for the *J. H. Deveraux*, both of which were slightly smaller than the *Onoko*.

Some industry insiders, including officials at Globe Ship Building, predicted that ships would stay the size of the *Onoko*, arguing that vessels larger than her would be too costly to load and unload.¹⁴ In fact, for a period of more than five years, the *Onoko* remained the largest ship built at the Globe yard. It is hard to explain that conservative thinking. At several of the ports on the upper lakes, chute-type ore loading docks already existed that were capable of rapidly loading vessels the size of the *Onoko*. In November of 1870, for example, the *R. J. Hackett* had loaded 1,065 tons of ore at Escanaba in only one hour and forty-five minutes. At that rate, the larger *Onoko* could have been loaded in something in the neighborhood of six hours, certainly not an excessive period of time for that era.

Unloading would have taken considerably longer, but there, too, major strides had been made prior to the launching of the *Onoko*. In 1880, the first steam-powered Brown Hoist unloader had been installed at Erie, Pennsylvania. Developed by Alexander Brown, the Brown Hoist still depended on laborers to hand-fill the buckets, or barrels, that were lowered into the hold of a ship. Once filled, however, the barrels were lifted from the hold and dumped into waiting rail cars or storage piles by cables controlled from a central point. The system could be set up so that cargo could be unloaded simultaneously from each hatch of a ship.

The year after the *Onoko* was launched, a similar unloading system went into operation at the South Chicago docks of the Illinois Steel Company. Developed by Robert Aspin, the Champion Ore Hoist consisted of several derrick-type hoists lined up side-by-side on the dock and spaced so they would match up with the hatches of ships unloading there. Tubs lowered through the hatches were filled by hand, but then a steam engine hoisted the tubs and emptied them into a trough that straddled the railroad tracks paralleling the dock. The ore could then be loaded directly into rail cars passing below the troughs.

Both the Brown and Champion hoists were significant improvements over previous unloading systems, which depended almost totally on manual labor, but unloading was still a painfully slow and laborious process. It often took longer to unload a ship than it did to move the ore from ports on the northern lakes to Erie, Cleveland, or Chicago. Shipowners were undoubtedly deeply troubled by the amount of time their valuable vessels spent tied up at the unloading docks.

At the same time, the *rate* at which cargo was loaded or

unloaded was unchanged, regardless of the size of the ship. Those who believed large vessels would be less efficient to load or unload than smaller ships failed to recognize that fact. If it took three days to unload 3,000 tons of iron ore from a ship the size of the *Onoko*, it would also take three days to unload three smaller ships each carrying 1,000 tons of ore. On a per-ton basis, the larger ship would spend the same amount of time at the dock as a smaller one. The larger ship would still be more efficient, because it could move the 3,000 tons of cargo down the lakes in a single trip, with a single crew. While that fact may not have been clear to people in 1882, it is a principle that guides the industry today: the greatest efficiency is achieved through the use of the largest vessel possible, taking into consideration the amount of cargo to be moved and the size restrictions imposed by the trade route. The *Onoko* was more efficient than the smaller ships she was in competition with, but less efficient than the larger ships that would eventually displace her as Queen of the Lakes.

Philip Minch died in 1887, and his son and heir, Captain Peter G. Minch, died in 1892. Their prosperous shipping company was taken over by the elder Minch's son-in-law, Henry Steinbrenner, and Henry's son, George M. Steinbrenner. In 1905, the Steinbrenners reorganized the fleet as Kinsman Marine Transit, the name denoting the family operation of the firm. At that time the plain, black stacks of the *Onoko* and other ships in the Kinsman fleet were adorned with a large letter "K." The "K" was subsequently replaced by an "S," reflecting the pivotal role of the Steinbrenner family in the development and operation of the fleet.

In 1915, the *Onoko* was in her thirty-fourth season of operations on the lakes, having outlived both Minches and most of the critics who had claimed that her iron hull would not be durable. Though she had been the largest ship on the lakes when launched, her Queen of the Lakes title had long since passed successively to the line of freighters following in her wake. She was one of the oldest bulk freighters in service and less than half the size of the ships that were in the forefront of the industry.

With one exception, her career on the lakes had been without incident. On May 16, 1896, the *Onoko* had been involved in a tragic accident off Racine, Wisconsin, on Lake Michigan. While operating in heavy fog, she collided with and sank the schooner *Mary D. Ayer*. Five of the *Ayer's* crewmen died as a result of the collision. The iron hull of the *Onoko* was virtually undamaged.

Then, on September 14, 1915, the aging workhorse was downbound on Lake Superior after loading 109,600 bushels of wheat at Duluth for delivery to Toledo, Ohio. When only seventeen miles out of the Duluth harbor, engineering personnel were startled to discover water coming up through the deck



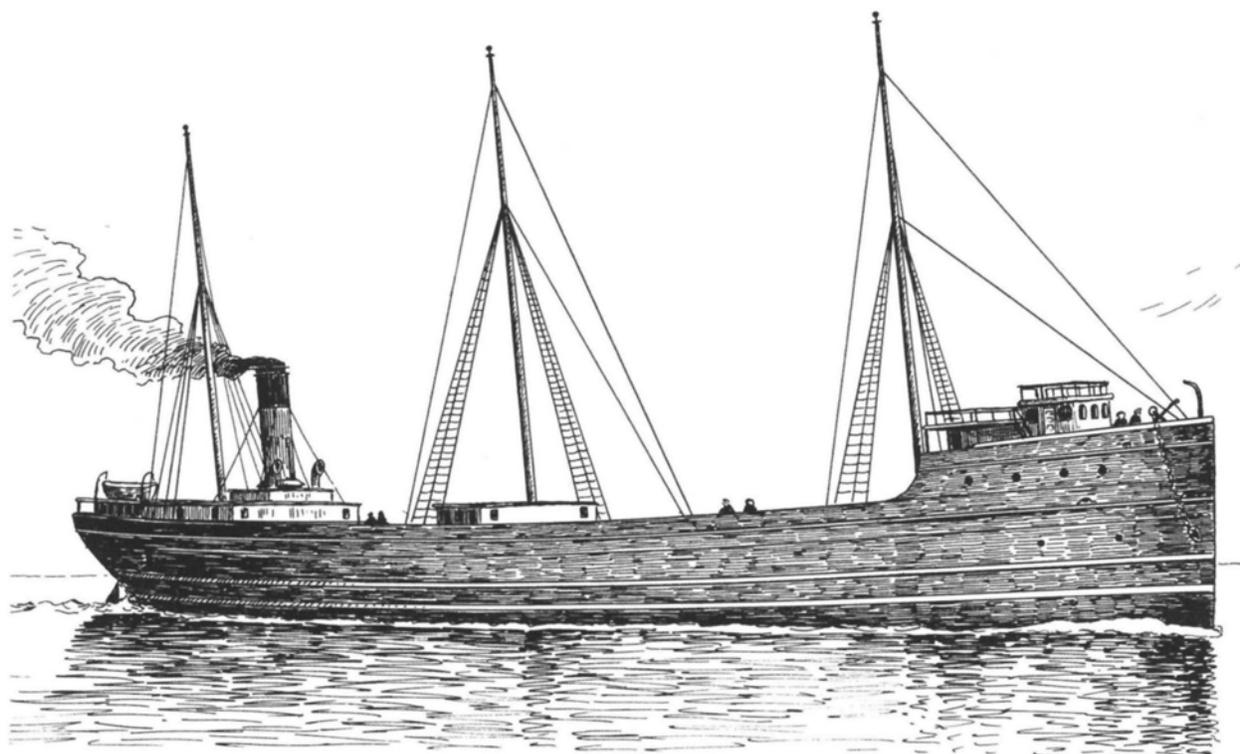
After 1905, the stack of the *Onoko* bore the "K" that identified her as part of the Kinsman fleet operated by Henry and George Steinbrenner, heirs to the shipping line begun by Philip Minch. Later, the Steinbrenners replaced the "K" with an "S," to emphasize the role they played in the continued operations of the former Minch fleet. (Author's collection)

grates in the *Onoko's* engine room. The engineer on watch immediately notified the captain and started the pumps in an effort to control the flooding. In short order it was obvious that the pumps could not keep up with the deluge coming through the hull. With water rising ever higher in the engine room, the captain had no recourse but to give the signal to abandon ship. As the stern of the *Onoko* sank ever lower into the calm waters of Lake Superior, the ship's lifeboats were launched and the sixteen crewmembers and one passenger rowed slowly away from the disabled vessel.

The *Str. Renown*, a tanker operated by Standard Oil, was nearby at the time and picked up the occupants of the two lifeboats. When the flooding in the engine room reached the blistering hot boilers of the *Onoko*, the boilers exploded with a loud roar, emitting billowy clouds of steam. On the deck of the *Renown*, the stunned survivors of the *Onoko* and their rescuers watched in hushed silence as the once-proud ship shuddered slightly and plunged stern-first to the bottom of the lake. In a matter of seconds, she was gone.

Word of the loss of the *Onoko* was flashed around the lakes. At Cleveland, Henry and George Steinbrenner and the employees of Kinsman Transit were staggered by the news. With only sketchy details to go on, the Steinbrenners at first concluded that the ship may have sunk as the result of sabotage. War had broken out in Europe several months earlier, and while the U.S. remained neutral in the spreading conflict, the wheat the *Onoko* carried on her final voyage was consigned to the British and their allies.¹⁵ The Steinbrenners feared that extremists who violently opposed any U.S. aid to the warring factions, or Americans of German or Austrian extraction—and there were many of them in the Duluth area—had somehow sabotaged their ship.

During the ensuing investigation, however, sabotage was ruled out as the cause of sinking. It was generally agreed that one of the *Onoko's* hull plates had rusted through or that engine vibration had caused a plate to drop off. With the hulk lying in 340 feet of water, no firm conclusion could be reached. As the *Onoko* was stricken from the roll of ships in the U.S.



Stanton's drawing of the ill-fated *Western Reserve*. The steel-hulled Minch freighter broke in half and sank during a freak August storm on Lake Superior in 1892. Captain Peter Minch, his wife, and two children were aboard the ship at the time for a summer holiday trip up the lakes. They were among the thirty-one victims of the sinking of the big freighter. With the death of Captain Minch, the Minch shipping interests were taken over by Henry Steinbrenner, who had married Captain Minch's sister. (Author's collection)

Great Lakes fleet, the only consolation for the Steinbrenners was that no lives had been lost in the mishap.

The kinsmen of the Steinbrenner-Minch clan had not always been so fortunate. When Captain Peter Minch was still at the helm of the company, he had contracted for the construction of the fleet's first steel-hulled freighter, the steamer *Western Reserve*. Launched at Cleveland Ship Building in 1890, she was slightly larger than the *Onoko* and one of the most modern ships on the lakes, certainly the pride of the Minch fleet. On August 28, 1892, the *Western Reserve* departed Cleveland light under the command of Captain Albert Myers, en route to Two Harbors, Minnesota, to take on a load of ore. Aboard as a passenger for a summer holiday was Captain Peter Minch, who had succeeded his father as president of the shipping company. The Minch party also included his wife, their two children, his

wife's sister—Mrs. Jacob Englebry—and Mrs. Englebry's young daughter. The holiday entourage was rounded out by the presence of Carl Myers, the captain's son.

Storm warnings had been posted when the *Western Reserve* departed the Soo on the afternoon of August 30, and while they were still in Whitefish Bay the ship had begun to roll in the growing seas. Captain Myers moved his ship out of the traffic lanes and dropped anchor, intending to ride out the storm "on the hook" and spare the passengers an uncomfortable ride on Lake Superior. When the wind and waves showed no signs of increasing in strength, Myers and Minch agreed that their ship could easily handle the seas. They weighed anchor and pressed on toward Two Harbors.

The storm grew in intensity as they passed Whitefish Point and made their haul toward the northwest. At about 9

p.m., all aboard heard a deafening roar and felt the ship quiver. Captain Myers looked out the rear windows of the pilothouse to see the deck of his ship cracking and tearing just forward of the stern cabin. He hurriedly sounded the alarm to abandon ship.

The next morning, personnel at the Deer Park lifesaving station near Grand Marais, Michigan, west of Whitefish Point, saw a lone man staggering down the beach toward them. It was Harry Stewart, a wheelsman from the *Western Reserve* and the only survivor of the tragedy played out on the storm-tossed lake the previous evening. Stewart reported that twenty-seven of the thirty-two people aboard the *Western Reserve* had managed to get off in the two lifeboats in the minutes after the ship started to break apart. The violent seas swamped one of the lifeboats almost immediately, however, and only two of its occupants managed to climb into the other boat, a small wooden yawl that was already overcrowded.

The nineteen people who found themselves crowded into the surviving lifeboat included Captain Myers, Captain Minch, all of the women and children, and eleven crewmembers, including Stewart. The *Reserve* sank as the survivors rowed away into the black night, their lifeboat battered incessantly by the huge waves. The small boat was in constant danger of being swamped by the seas, and half her occupants rowed while the other half bailed.

At daybreak they could see that they were only a mile offshore, and they rowed toward the beach with renewed strength. Then, as the nineteen cold, drenched survivors of the *Western Reserve* pulled steadily toward the safety of the shoreline, the small boat was swamped and capsized by a towering wave, and they were flung into the water. Stewart struggled to put on a cork-filled lifebelt that had floated free from the swamped boat. Looking about, Stewart saw that only he and Captain Myers's son were still afloat. Together, they started to swim toward the beach, but young Carl Myers soon tired and sank from sight. Alone, Stewart swam on.



The Minch freighters *Onoko* and *Western Reserve* both met tragic ends on Lake Superior. The *Onoko* sank near Duluth, while the *Western Reserve* went to the bottom just west of Whitefish Point. (Author's collection)

The bodies of Captain Minch, three of his family members, and eight crewmembers washed up on the beach in the aftermath of the unusually violent August storm. No other bodies were ever recovered. Lake Superior had claimed thirty-one lives.¹⁶ The Great Lakes shipping community was rocked by word of the sinking of the *Western Reserve*. In Cleveland, the Minch and Steinbrenner families gathered to mourn the loss of their loved ones and the great steel ship they had all been so proud of.

Based on the detailed account of the sinking provided by Harry Stewart, industry officials initially thought the ship broke up because she was not carrying enough water ballast when she went out into the storm. Riding high in the water, the *Western Reserve* would have tended to teeter-totter on top of the huge waves, placing great stress on her hull. Shipbuilders and shipowners were still debating the cause of the sinking two months later when, on the night of October 28, the steel freighter *W. H. Gilcher* sank with all hands during an intense Lake Michigan storm. The *Gilcher* was virtually a twin of the *Western Reserve*. She had been under construction at Cleveland Ship Building when the Minch freighter had been launched.

Suspecting that the loss of the two ships under similar circumstances was more than merely a coincidence, investigators began to look closely at the steel that had been used in their construction. Testing eventually proved that the Bessemer steel was too brittle to stand up under the twisting and pounding a ship had to endure in heavy seas. Under stress, the steel plates and framing members would develop small cracks that could eventually lead to hull failure.

Some shipbuilders advocated abandoning steel altogether and returning to building iron ships. While many people in the industry had questioned the strength of iron, tests had shown that hulls like that of the *Onoko* were probably more resilient to bending, twisting, and deterioration than ships like the *Western Reserve* and *Gilcher* that were built of Bessemer steel.¹⁷ Refinements in the steelmaking process soon produced plates and frames better suited to shipbuilding than those used on the two ill-fated freighters, but the problem of brittle steel continued to plague the industry until well after World War II. As late as 1966, the loss of the *Daniel J. Morrell*, a 600-foot freighter built in 1906, was attributed to structural failure resulting from brittle steel (See Chapter 16). Despite the ongoing problems caused by substandard steel, shipbuilders declined to return to the use of iron. As a result, the *Onoko* went into the record books as the only iron-built Queen of the Lakes.

Notes

1. Dana Thomas Bowen, *Memories of the Lakes* (Cleveland: Freshwater Press, 1969), 18.
2. James Clary, *Ladies of the Lakes* (Lansing: Michigan Department of Natural Resources, 1981), 105–106.
3. J. B. Mansfield, ed., *History of the Great Lakes*, vol. I (Chicago: J. H. Beers and Co., 1899; reprint, Cleveland: Freshwater Press, 1972), 408–409.
4. *Ibid.*, 692.
5. Interestingly, the first iron passenger steamer built at Wyandotte was christened *Queen of the Lakes*, although it was only a diminutive 108 feet long—indicating that the title was not always associated with long ships, as it is today.
6. Gordon P. Bugbee, “The Life and Times of the Bessemer Fleet, Part I,” *Telescope* 27, no. 2 (March–April 1978): 41.
7. Dates given for the *Onoko*, and those used throughout the book, represent the period during which the vessel was Queen of the Lakes, generally from their date of launching until the launching of the next longer ship.
8. Harry Benford, Kent Thornton and E. B. Williams, “Current Trends in the Design of Iron Ore Ships,” paper presented at the meeting of the Society of Naval Architects and Marine Engineers, June 21–22, 1962, 19.
9. Gordon P. Bugbee, “Iron Merchant Ships - Part Two,” *Telescope* 11 no. 3 (March 1962): 50.
10. Richard Wright, *Freshwater Whales* (Kent, OH: Kent State University Press, 1969), 5.
11. *Telescope* 15, no. 4 (April 1966): 82.
12. Mansfield, 408.
13. *Ibid.*, 409.
14. Norman Beasley, *Freighters of Fortune* (New York: Harper and Brothers, 1930), 183.
15. *Telescope* 5, no. 6 (June 1956): 5–6.
16. James P. Barry, *Ships of the Great Lakes* (Berkeley: Howell-North Books, 1973), 145–47.
17. Dwight Boyer, *Great Stories of the Great Lakes* (New York: Dodd, Mead and Company, 1966), 63–68.