

AMERICAN CANALS

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THE AMERICAN CANAL SOCIETY

BULLETIN NUMBER 72

Editorial Address—809 Rathton Road, York, Pa. 17403

FEBRUARY 1990

PRESIDENT'S MESSAGE

As we enter the last decade of the 20th Century, your society is 18 years old, and this is its 72nd edition of AMERICAN CANALS. That's an impressive seventy-two issues of canal history and news, thanks to your continuing support of the hard work of Editor Bill Shank and Secretary/Treasurer Charlie Derr. A tip of the top hat to you all!

I should have mentioned last time that we owe a vote of thanks to John Burtniak for his work on our joint meeting on the Welland Canals. We also learned quite a bit about ceremonial occasions, in which the Canadians are well practiced. How about a toast to George Washington, De Witt Clinton, and your favorite canal engineer at your next dinner meeting?

After reading Roger Squires' article in the last issue, in which he fulfilled his dreams of traveling on the Grand Canal of China, and across Russia on the Trans-Siberia Express, I was inspired to fulfill one of my own dreams, of ice-skating on a canal for at least fifteen minutes, for which I had already invested \$1.98 in the form of a pair of skates from a thrift shop. Thick ice is relatively rare on the canal in Richmond, so I rushed out after Christmas with a pillow and George Rawls, who went around in circles, backwards and forwards, to demonstrate the technique, while I slid around on the ice down to the Great Ship Lock. Next winter the plan is to devote fifteen minutes to cross-country skiing on a towpath.

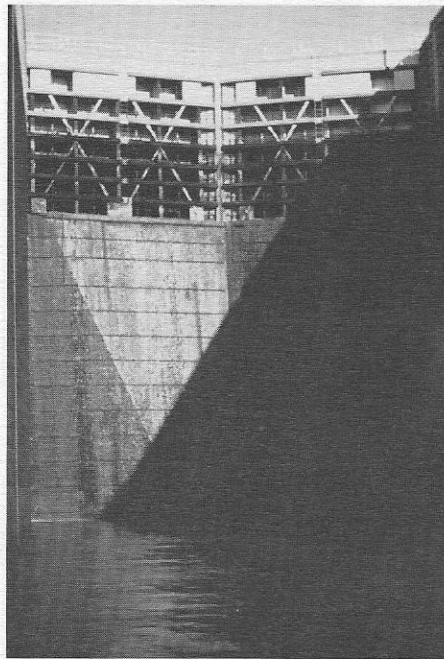
We've just received a copy of a book on Chinese Canals (448 pp., 1988) with maps but no pictures so it's hard to say what it's about. Would anyone who knows modern Chinese like to read it and let us know?

Bill Trout



George Rawls, Jimmy Moore (wife & child) and Bill Trout celebrate the 200th anniversary of the Grand Opening of the James River Canal in Richmond, Dec. 29, 1789. They are standing on the entrance archway to the canal.

"ELEVATOR-SHAFT" LOCKS: HOW MANY?



Walter F. George Lock.

Generally speaking, as engineers have learned to achieve greater lifts per lock, they have also had to build for larger vessels and larger flotillas. The result is that as locks have gotten higher they have also gotten wider. The 15-foot widths characteristic of the early 18th century rarely went with lifts of over 10 feet; while the great lifts of such modern locks as Wilson (93 feet) and Bay Springs (84 feet) come with the now-standard width of 110 feet. Only occasionally have "elevator'shaft" locks been constructed — locks with a lift that exceeds their width. The now-defunct Lehigh Canal had some of these exceptional locks, as described in Bill Shank's *The Amazing Pennsylvania Canals*, p. 64. There is also at least one on a still-functioning waterway. The Walter F. George Lock, at mile 75.1 on the Chattahoochee River, is 82 feet wide and has a lift of 88 feet.

Can any of our readers identify others — ancient or modern?

David Ross

Our ACS Secretary-Treasurer, Charlie Derr, reports that a number of members have not paid their 1990 dues. He is sending out a final "reminder"; please respond. Otherwise, this is the last issue of AMERICAN CANALS you will see

PIER PRESSURE

By David F. Ross

(The quarterly report of the navigable canals committee)

You cannot cruise the inland waterways very much without being struck by the extent to which waterfront communities, some of which go to great lengths to draw the motoring public in off the highways to sample their delights, ignore the boating public. How many times have we passed by a Tuscaloosa or Paducah, primed to go ashore to stock up on groceries or indulge in a restaurant meal, anxious to inject some of our tourist dollars into the local economy, and been frustrated by the lack of any sort of dockage? St. Louis is one of the more conspicuous examples of this common municipal deficiency. Here is the river city *par excellence*, the gateway to just about everything, with its waterfront renaissance drawing visitors by car, by rail, by bus, by air, by everything but boat, for there is no place there to tie up. When I have pointed this out to St. Louisans, I have been given cogent explanations why it is difficult to site a marina in the central city. For the same reasons, marinas are generally in rural areas; but there are few riverine cities that could not easily site a 50- or 100-foot dock as a parking place for waterborne tourists. Mostly, I believe, they just haven't considered the possibility.

I was particularly struck by this perceptual hiatus when I recently attended a two-day conference on tourism development on the Tenn-Tom Waterway. Everything was concerned with the waterway as a sight that people might travel by car to see, and nothing with the waterway as a carrier of people to the tourist-hungry communities along its banks. I cite just two of many possible examples. When the Tenn-Tom first opened, the *National Geographic* devoted a good deal of space to it, and especially featured two communities [March 1986, pp. 364-87]. One was Holcut, Mississippi, the only town drowned out by construction of the waterway. A memorial park has been created to remind passersby of the human cost of progress. Presumably, for those who pass by on land there is some sort of historical marker to tell them of what they are being reminded. For the passerby on the water, however, if you don't already know the story you will merely wonder what in the world is a *Holcut*.

The other featured community was Memphis, Alabama, a small, black town which had hoped for great things from the Waterway and was disappointed to have gotten only a launching ramp. On my first cruise of the Tenn-Tom I intended to stop off at Memphis, see for myself what its possibilities were, and spend some money. Most Corps of

(Continued on Page Twelve)

American Canals

BULLETIN OF THE AMERICAN CANAL SOCIETY

**“DEDICATED TO HISTORIC CANAL
RESEARCH, PRESERVATION
AND PARKS”**

AMERICAN CANALS is issued quarterly by the American Canal Society, Incorporated. Objectives of the Society are to encourage the preservation, restoration, interpretation and use of the historic navigational canals of the Americas; to save threatened canals; and to provide an exchange of canal information.

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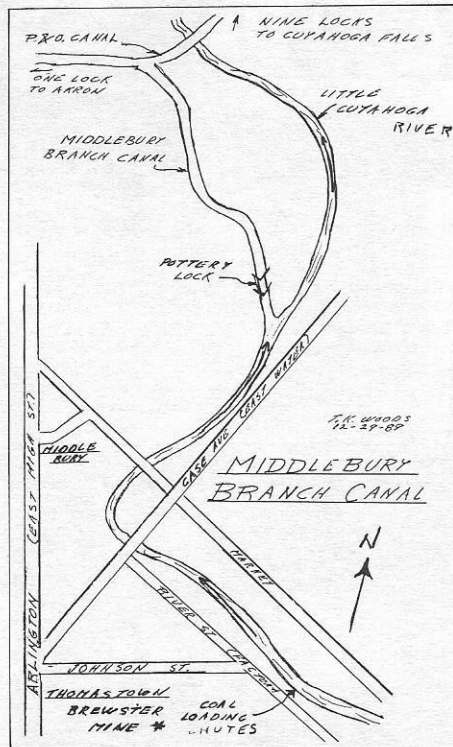
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THE MIDDLEBURY BRANCH OF THE P & O CANAL



By Terry K. Woods

Residents of communities all along the proposed route of the ‘CROSS CUT CANAL’, were enthusiastic about the possibility of being on a direct water route between the state systems of Ohio and Pennsylvania. Its hard to imagine, though, any more joyous community than the promising industrial center of Middlebury. This town, tucked into the western edge of Portage County in Ohio, on the civilization side of the big Cranberry Bogs, boasted an iron works and several mill sites as early as 1820. Several prominent local citizens formed a newspaper about that time, primarily to promote the proposed Ohio canal and get it routed through their town. Unfortunately, the ink on that first issue was hardly dry before the information came down that the route for the canal had been picked. It would run some four miles west of their village. The Cranberry bogs would be dammed to form reservoirs, and provide a water source for the canal’s summit.

Therefore, the joy of the Middleburians was understood when, in 1828, a survey for a canal to connect the states of Ohio and Pennsylvania came right through the heart of the village. But, such projects never move swiftly enough. Not nearly swiftly enough to keep the town of Akron from building up along the Ohio canal. Not swiftly enough to keep a Middlebury Doctor from damming the stream that ran through the village and building a mill race to a point just below Akron where the chained waters provided power for rival mill sites. Not fast enough for a new manufacturing town, Cuyahoga Falls, to be built to the north east of Middlebury.

Therefore, when construction of the Pennsylvania & Ohio canal was actually begun in 1836, it ran through Cuyahoga Falls, stepped down nine locks to the Doctor’s mill race then ran in its enlarged channel to the mills of North Akron. The

full power generated from those nine locks, plus that from the mill dam at Middlebury, went to power new industries at North Akron. Middlebury’s industrial advantage had been torn away. The village had lost its clout in the State Legislature and had even been denied its place on the P & O Canal!

The main canal left the Middlebury mill race a mile and a half below the village, crossed the Little Cuyahoga river on an aqueduct and negotiated the nine locks to Cuyahoga Falls. As a sop to the village, a one and a quarter mile long branch canal followed the left bank of the river into the industrial section of Middlebury to the old mill race dam. A lock was located, here, adjacent to the Richardson & Spafford Pottery. This lock gave boatmen access to the upper river and the rest of the village. This lock was known locally as ‘Pottery Lock’. Clarence Gilhart boated coal and clay to the pottery from the ‘Ten Mile Level’ just north of Bolivar for a number of years.

A number of other industrial sites were located upstream of the lock and boatmen often locked into the river and poled their craft upstream to service them. Beginning in the 1850’s, The Brewster Coal Mine shipped nearly its entire output via the Little Cuyahoga river and Middlebury Branch Canal. This mine was located just south of the intersection of Arlington Road and Case Avenue in present-day East Akron. This area was known for many years as ‘Thomastown’. The loading chutes were quite possibly situated in that space between the current facilities of the Guran Sand & Gravel Company and the Goodyear Tire & Rubber Company’s Corporate Headquarters. This site was a long mile of arduous poling above Pottery Lock and the mine owners were required to tip boat Captains an extra \$25.00 per trip just to get them up to the chutes.

When the western portion of the P & O Canal stopped carrying traffic prior to the early 1870’s, the Brewster mines constructed a five-mile long tramway to the Lower Basin of the Ohio & Erie canal. Extensive loading facilities were constructed here and three or four boat loads of coal a day were sent north to Cleveland. Gilhart also built a ‘Clay Dock’ at the Lower Basin.

Today (1990), no evidence of Pottery Lock exists, and only a few damp patches of the P & O Canal/Middlebury Mill Race can be located between here and downtown Akron. A stone dam, likely rebuilt on or near the original canal dam site backs up the waters of the Little Cuyahoga between twin stone retaining walls until those waters disappear beneath the shrubs and well-kept lawns of the Goodyear complex.

NEW CANAL BOOK

ERIE CANAL MUSEUM — PHOTOS FROM THE COLLECTION has just been issued. It is a 90-page, 8½” x 11” paperback, with an attractive cover and 251 photos, carefully selected from the thousands in the museum archives. It illustrates life on the Erie Canal, old and new, over nearly a century of operation. Well documented, with excellent photo captions and an Index. Write: Erie Canal Museum, 318 Erie Blvd. E, Syracuse, NY 13202. Price \$9.95, plus \$2.25 shipping cost.

THE PENNSYLVANIA CANAL COMPANY 1867 - 1926

By William H. Shank, P.E.

If you are a canal buff who has ever wondered about the Pennsylvania Canal Company, how it came into existence, what canals it operated, and what finally happened to it — read on.

We go back in history to the year 1857, when the Pennsylvania State Canal Commissioners in Harrisburg, realizing they were fighting a losing battle against the growing railroad industry in Pennsylvania, put the "Main Line of the Public Works" up for sale. The new Pennsylvania Railroad had been taking business away from them ever since PRR had finished its own rail lines between Harrisburg and Altoona and Johnstown and Pittsburgh. The completion of Pennsy's own road over Allegheny Mountain in 1854 (in direct competition with the State's cumbersome Allegheny Portage Railroad) was the final blow to the old "Main Line" system.

The Pennsylvania Railroad Company was the only bidder when the old canal-railroad system went on the block in 1857, and at a figure of \$7,500,000 took over the entire route from the Canal Commissioners. This included the Columbia-Philadelphia Railroad, the Eastern Division Canal, Juniata Division Canal, Western Division Canal and the Portage Railroad.

The prime interest of the Pennsylvania Railroad was in the Philadelphia-Lancaster section of the Columbia Railroad, which they greatly improved at once and added to their own "Main Line" route between Philadelphia and Pittsburgh. They quickly abandoned the Allegheny Portland Railroad and shipped the APRR rails west to be used on one of their rail routes into Chicago.

However, conditions of the sale by the State to PRR of the old "Main Line" bound the purchaser forever after to keep in good repair and operating condition the canals east of the Mountains, and as much of the Western Division Canal as lay between Blairsville and Pittsburgh until such time as the (North) Western Railroad Company could be completed along the old canal route into the Borough of Allegheny.

To hasten this process the Pennsylvania



The West Branch Canal at Williamsport, showing the towpath and a tied-up freighter. Note the Market Street "Swing Bridge" in the background.

Railroad sold to the Western Pennsylvania Railroad the Western Division Canal route between Freeport and Allegheny, about 1865. Having its own line between Johnstown and Blairsville, PRR abandoned that section of the old Western Division Canal in 1863. The remaining canal section was then closed down in 1865 and was used by the Western Pennsylvania R.R. for its own line into Allegheny Borough.

The remaining Main Line canal sections in central Pennsylvania had been allowed to deteriorate, in anticipation of the sale. Nevertheless, PRR management, seeing the value of the canals for transporting heavy freight such as coal, lumber and other commodities where fast delivery was not

a requisite, deepened the channels of the old canal beds and generally improved their operation to the point that many of them became self-sustaining once again.

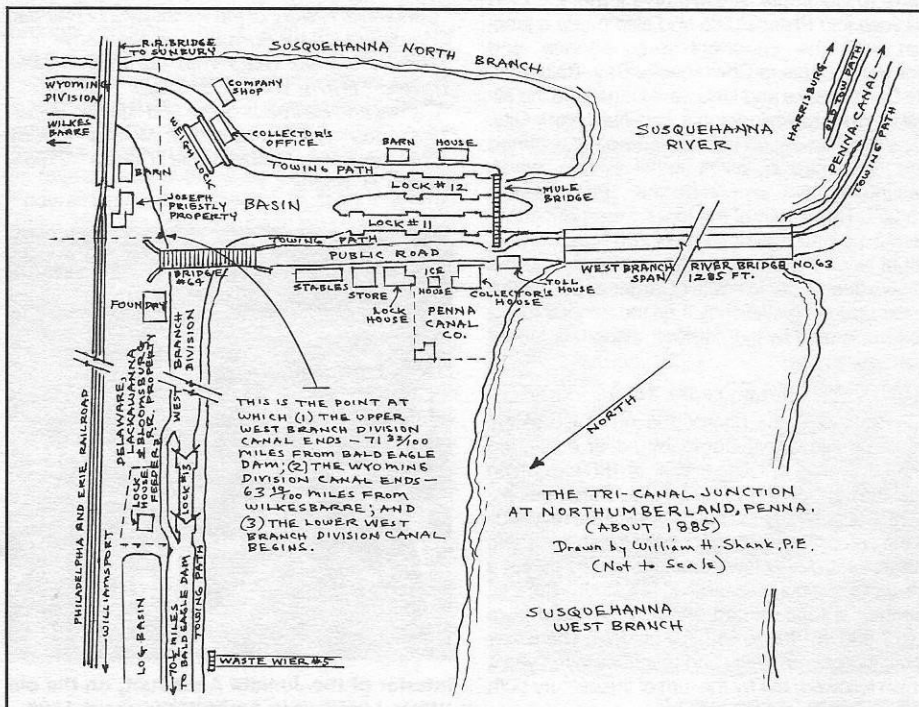
In the meantime, the Sunbury and Erie Railroad, an independent line incorporated in 1837, was struggling to obtain funds and complete its line. By 1855 it had extended its rails only as far west (from Sunbury) as Williamsport, and its funds were nearly exhausted. The State of Pennsylvania came to the aid of the railroad in 1858 with an offer to sell them the remaining canals in eastern Pennsylvania which had not already been purchased by the Pennsylvania Railroad Company. This offer was accepted for a consideration of \$3,500,000 — with the understanding that the Sunbury-Erie could then resell these canals (hopefully at a profit) to aid them in financing their railroad all the way to Erie. The necessary legislation was passed in April of 1858, and a new mortgage was approved by the State, which would enable the company to pay for the canals.

Lehigh Coal & Navigation

After the transfer, the Sunbury and Erie Railroad immediately sold the old Delaware Division Canal to the Lehigh Coal and Navigation Company in Bethlehem, Pa. — allowing them to gain full control of the Lehigh and Delaware Canals, virtually to their prime coal market — Philadelphia.

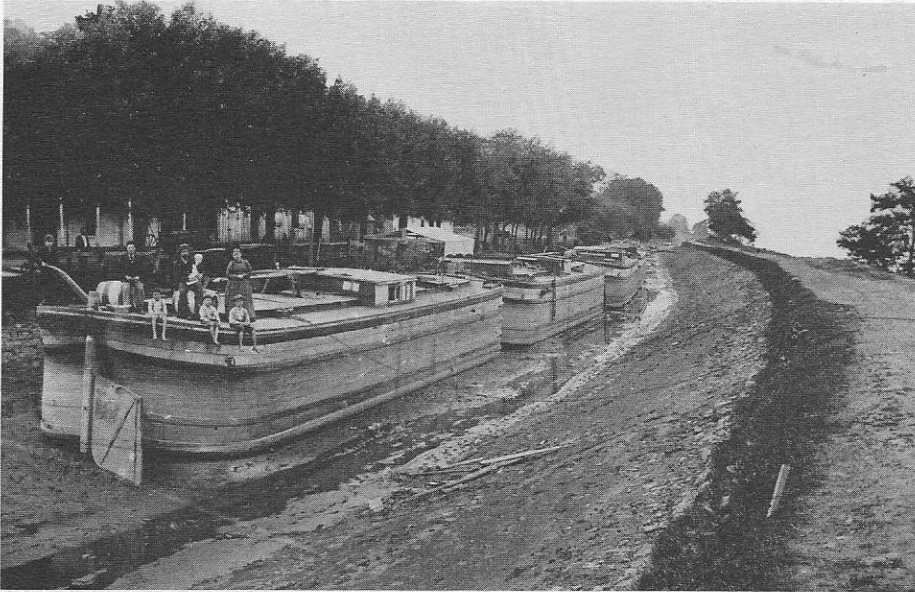
The Sunbury and Erie Railroad, also in 1858, sold the entire North Branch Canal system to the North Branch Canal Company, who in turn sold the lower 62 miles between Northumberland and Wilkes-Barre, to the Wyoming Canal Company. Also in 1858, the Sunbury and Erie Railroad sold its interest in the old West Branch and Susquehanna Division Canals (Farrandville to Duncan's Island) to the newly formed West Branch and Susquehanna Canal Company.

All of these sales and transfers of former state canal properties actually did little to increase the overall capital of the Sunbury and Erie Railroad.



(Concluded on Page Four)

THE PENNSYLVANIA CANAL COMPANY



A stalled canal train along the Wyoming Division, waiting for a break in the canal bank to be repaired. Circa 1885.

(Continued from Page Three)

By the end of 1859 their total indebtedness forced them to suspend work on construction. The State again tried to help by granting the company the right to float a new bond issue in 1861, but the Civil War broke out and construction was further delayed. In the meantime, the Pennsylvania Railroad had acquired control of the Northern Central Railroad (1861) from Baltimore to Sunbury. PRR looked with favor on a connection with the Sunbury and Erie Railroad which could extend their control all the way into the Lakeport of Erie. The upshot of the matter was that in 1862, the Pennsylvania Railroad leased the Sunbury and Erie (now renamed the Philadelphia and Erie Railroad) for a period of 999 years. With the financially powerful Pennsylvania Railroad backing them, the Philadelphia and Erie was able to complete its line into Erie by 1864.

Pa. Canal Co. Formed

Now in firm control of the railroads and certain canal facilities in the central Susquehanna watershed area, PRR now formed the Pennsylvania Canal Company, a fully-owned subsidiary, to operate and maintain its canals. This was done January 1, 1867, with PRR conveying to the new company its entire interest in the canals they had acquired from the State, with the canal company assuming all the obligations of the Act of 1857 for the maintenance and continued operation of the canals.

The Pennsylvania Canal Company then proceeded to purchase the majority of stock of the West Branch and Susquehanna Canal Company, tapping the extensive lumber industries in and around Williamsport. In 1869, the new canal company also merged with the Wyoming (Valley) Canal Company, with full access to the anthracite fields at Wilkes-Barre and Nanticoke, Pa. In 1872, to gain access to the important Lykens Valley Coal fields, the Pennsylvania Canal Company also purchased majority stock in the 12-mile Wiconisco Canal running from Clarks Ferry to Millersburg. About 1874, the company also acquired a controlling interest in the stock of the Susquehanna Coal Company, better-known for its gravity railroads, and with large but underdeveloped coal

properties along the Wyoming Valley Canal. Its rail line connected Port Griffith, on the Susquehanna, with Hawley and the Delaware and Hudson Canal system.

The Pennsylvania Canal Company now had a network of approximately 360 miles of canals in central Pennsylvania under its control, with access to some of the major anthracite coal producing areas in the eastern part of the State as well as the important logging and lumber industries in Lycoming County, and west. This included the old Eastern Division, the Juniata Division, the Wiconisco Canal, the Susquehanna Division, the West Branch Division and the North Branch Division, lower section (Northumberland to Wilkes-Barre).

The major thrust of the new company activities in the 1870's was improvement to its facilities in what then became its "Main Line" from Wilkes-Barre to Columbia. At Columbia it met the PRR rail lines into Philadelphia and also made a junction with the important Susquehanna and Tidewater Canal to Chesapeake Bay, Baltimore, the Chesapeake and Delaware Canal and the all-water route to Philadelphia and New York City. Early in its operation the new company widened and deepened its entire canal system, which became known simply as the "Pennsylvania Canal". The length of the locks were doubled to permit the passage of boats of 260 gross tons — about twice the previous size. It also developed its own fleet of canal boats of larger capacity and better operating efficiency than the general run of boats operated by the private transporters, under State ownership.

Banner Year - 1869

In spite of these efforts, the revenues of the Pennsylvania Canal Company never exceeded \$735,000 — in its banner year of 1869, in which year the important Wyoming Valley Canal was acquired. This acquisition nearly trebled the revenues of the company, which continued within this same range for the next few years. However, by 1879 the gross revenue had fallen to \$283,000. The total number of tons carried annually dropped from 1,077,930 in 1869 to 668,707 in 1878. There was some increase in traffic and revenues in the years which followed, but by the turn of the century both were down to almost zero.

At the West Branch end of the system, the canal company had previously built a so-called "Side Cut" south for about four miles to meet the Bald Eagle and Spring Creek Navigation at Flemington.

However, the latter canal was abandoned after a serious flood in 1865. The original extension from Lock Haven to Farrisville was abandoned in 1874. There were short "side cuts" to both Muncy and Lewisburg which also brought some additional traffic into the West Branch Canal.

As of December 31, 1874, the total recorded assets of the Pennsylvania Canal Company were \$7,811,000 — of which \$6,812,000 represented the canal investment, \$230,000 worth of canal boats, and \$597,000 invested in the stock of, or advances to, the Susquehanna Coal Company. The capital liabilities of the company at that time consisted of the \$4,477,700 par amount of their stock, \$2,641,000 in bonds, and \$507,000 advances from the Pennsylvania Railroad Company.

One of the worst floods of the century hit many of the canals of Pennsylvania in 1889, forcing the abandonment of the more remote portions of the Pennsylvania Canal Company system that year. Final abandonment came in 1901, by action of the stockholders on April 11th of that year, with the books showing a deficit of \$2,264,000. The company was not formally dissolved until 1926, remaining in the business of selling real estate, from its linear holdings, to municipalities, industries and individuals along the route of "the Pennsylvania Canal". After the company had gone out of business, its remaining real estate assets reverted to the Pennsylvania Railroad Company. Surviving maps show that canal property sales were made by PRR as recently as the 1950's.

Historians tell us that the old Pennsylvania Canal Company and the now defunct Pennsylvania Railroad fulfilled its moral obligations to the State of Pennsylvania by going as far as could reasonably be expected in maintaining and improving the canals and their equipment to make them profitable. It was the competition between railroads which narrowed the margin between rail and water rates to the point at which the canals could no longer compete.

References:

"Centennial History of the Pennsylvania Railroad Company" (1949) Burgess and Kennedy
"Three Hundred Years With the Pennsylvania Traveler" (1976) William H. Shank
"Canals and Railroads of the Mid-Atlantic States, 1800-1860" (1981) Porter and Mulligan (1986)
"The Amazing Pennsylvania Canals" (1986) William H. Shank



Interior of the Juniata Aqueduct, on the old "Main Line" near Amith Hall, about 1895.

THE BLACK WARRIOR: MICROCOSM OF WATERWAY POLICY DEVELOPMENT

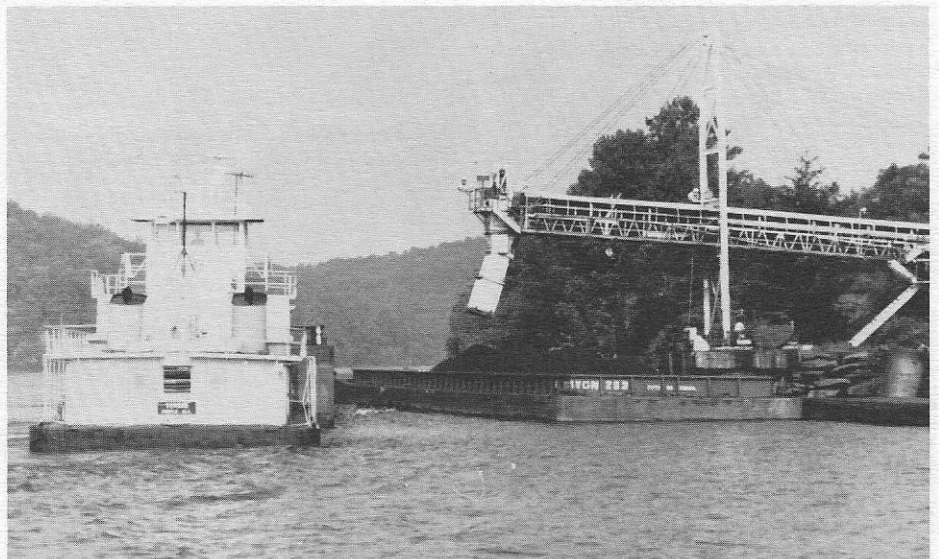
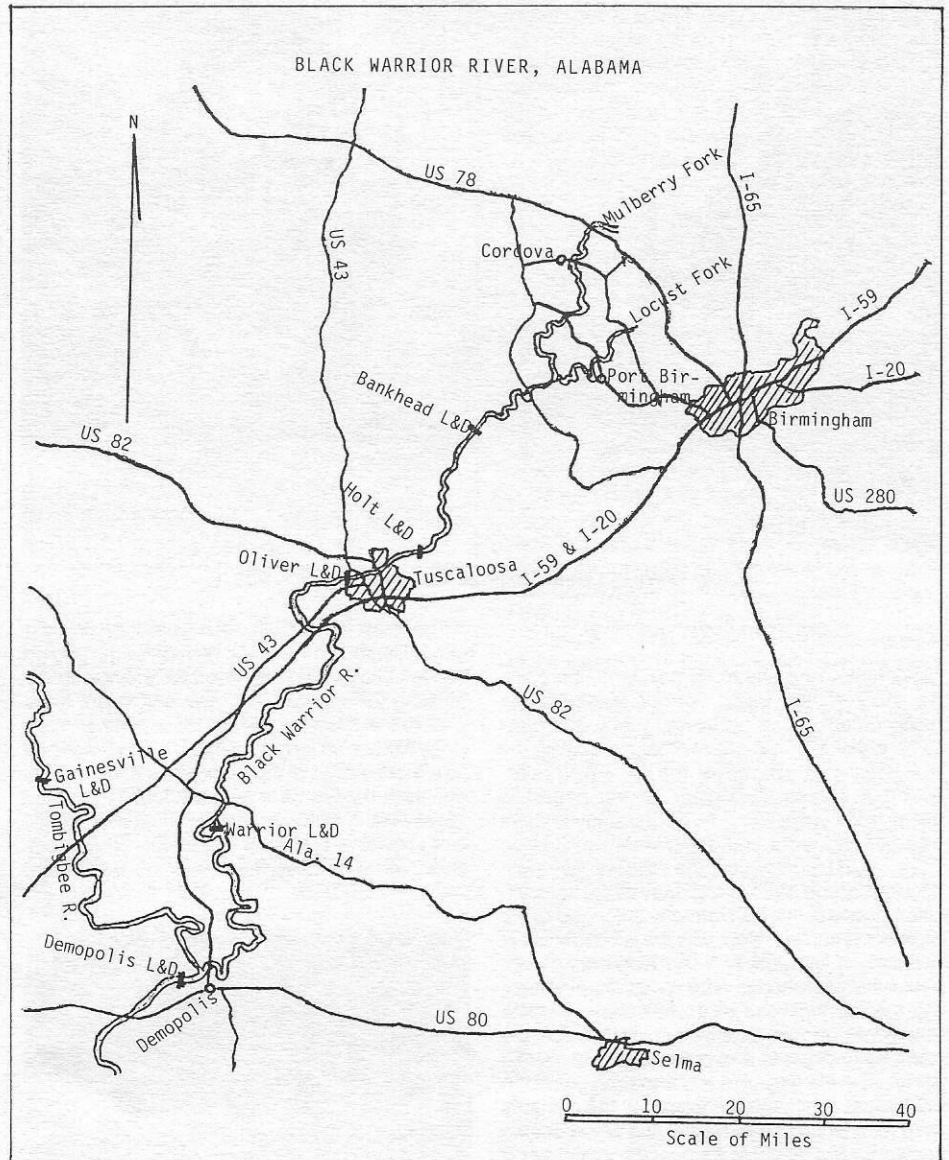


The Author at the helm of the "Rosa Parks".

By David F. Ross

The Federal Government's transportation policy, particularly as it applies to inland waterways, has undergone a number of drastic changes since it was first comprehensively enunciated in the Gallatin Report of 1808. Turning points have usually been associated with major wars. The Civil War marked the beginning of the end of the steamboat and of a general decline in the commercial importance of the inland waterways. Paradoxically, however, it also initiated a tremendous increase in the federal funding of waterway improvement projects. Prior to the Civil War, concern about constitutional limitations on the role of the Federal Government had meant that most of the canal building and canalization work undertaken during that great era of canal preeminence was the work of the states. With the doctrine of state sovereignty effectively laid to rest by the outcome of the Civil War, the Federal Government embarked with great and growing enthusiasm on what increasingly appeared to be a policy of attempting to resuscitate the dinosaur. The result was that by the time of the First World War, there was a huge federal investment in inland waterways which were scarcely being used at all. World War I then brought another abrupt shift in policy. The development of waterways continued, but the promotion of commercial transport became the activity of highest priority. This policy was, to the surprise of many, highly successful. In time, the dinosaur began to breathe again. Commercial traffic revived until, in the wake of World War II, the Federal Government began to carry out what some would say ought to have been its policy all along, a program of maintaining and improving the waterways more-or-less in response to the demand of commercial carriers.

Alabama's Black Warrior River provides an epitome of this panorama of federal policy. Before the Civil War, as a purely intrastate stream, it was thoroughly removed from the jurisdiction of the Federal Government. Following the Civil War, it became a segment of the Black Warrior — Tombigbee Waterway, consisting of the Mobile and Tombigbee rivers between Mobile Bay and Demopolis, and the Black Warrior River between Demopolis and the vicinity of Birmingham. This project, executed and administered by the Corps of Engineers, included 17 locks and dams, 13 of them on the Black Warrior segment. It was begun in 1888 and completed in 1915, just as the American economy was gearing up to supply the



Maneuvering barges at the coal-loading facility, mile 354.

(Concluded on Page Six)

BLACK WARRIOR RIVER



A tow leaving Oliver Lock at Tuscaloosa, mile 338.1.

(Concluded from Page Five)

belligerents in the First World War. Up to this point, the story of the Black Warrior illustrates the development of U.S. waterway policy, but does so no better than a score of other rivers. With the next shift in policy, however, the Black Warrior acquired a singular distinction among canalized rivers. In the years when the Federal Government was building locks and dams wherever flowing water could be discerned, the railroads were with equally massive effect taking away all the transportation business that had formerly belonged to the waterborne carriers. Now, with the economy at last operating at full capacity, it suddenly became apparent that the railroads were not capable of handling the job they had taken on. Using wartime emergency powers, the government took over the railroads, and also took over whatever it could find still afloat in the way of inland waterway transport equipment. When the war was over, the railroads were returned to private control, but what became known as the *Federal Barge Line* remained a government owned and operated freight-hauling business. It operated briefly here and there from time to time, but its original and enduring place of operation was the Lower Mississippi, the Black Warrior — Tombigbee, and the intracoastal waterway connecting the two.



The Federal Barge Line's pier at Port Birmingham.

The latest phase in federal waterway policy is also illustrated on the Black Warrior, as the original 13 locks have been replaced by 4 larger locks, allowing for speedier passage and larger tows. One of the four, the William Bacon Oliver Lock (originally known as the Tuscaloosa Lock) was built as a modification of the original canalization project. Its purpose was to replace locks 10, 11, and 12, all built in 1896 within a one-river-mile stretch and providing a total lift of 29 feet. When completed in 1939, Oliver Lock was the largest and



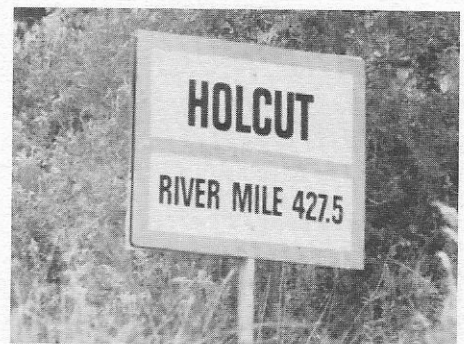
The "Rosa Parks" resting on one of the Black Warrior's many fine, sandy beaches, mile 327.5.

most modern element in what was now an 11-lock system. Then, when modernization of the entire project was undertaken following World War II, Oliver was too new to be considered obsolete, so it remained to become the smallest and oldest element of the new 4-lock system. With a 95' by 460' chamber, it was three times the area of the original locks, but is now an awkward two-thirds the area of the other locks in the system, and a troublesome bottleneck.

For the recreational boater, the Black Warrior offers both challenges and rewards. For members of the American Canal Society, historical interest ranks high among the rewards. Portions of several of the original locks have been preserved, including the cut-stone landwall of the oldest, in

Tuscaloosa. (For complete details, see William E. Trout, III, ed., *The American Canal Guide*, part 3 [July 1979], pp. 22-23.) Most of these can be seen as well by land as by water, but the one which is still completely intact and above water, the tandem lock 17, can be visited only by water. At Port Birmingham, the Federal Barge Line's pier, although much battered, is still intact. Especially for those who come to it off the Tenn-Tom Waterway, which never ceases to remind you of its man-made character, the Black Warrior is a relatively wild and scenic river, with an attractive tendency to meander and with numerous clean, sandy beaches. It carries a respectable amount of commercial traffic, but very few pleasure craft except in the uppermost (Bankhead) pool.

The challenges are related to the small volume of recreational traffic. Above Demopolis, where the Black Warrior enters the Tombigbee, there is no place to buy fuel or other supplies on the water for 130 miles. There is a first-class restaurant just



Memorial or Trivia Quiz? (See Page One)

on the northern edge of Tuscaloosa which provides a dock for waterborne diners, but for gas, groceries, ice, showers, or any of the other land-based amenities that make cruising possible, there is nothing below the Holt Lock and Dam. Also, the locks appear to have been designed with only the commercial tows in mind. There are no signaling devices, and the boater who is not equipped with two-way radio may have difficulty attracting the attention of locktenders.

A bound volume of aerial photographs is the closest thing you can get to navigation charts of the Black Warrior. It also includes the Tombigbee and Mobile rivers from Demopolis to Mobile, and may be purchased from: District Engineer, U.S. Army Engineer District, P.O. Box 2288, attn. CESAM-LO-SR, Mobile, Alabama 36628-0001. A check or money order for \$11, payable to *Treasurer of the United States*, should accompany your order. A directory of facilities for boaters and other points of interest will be found in the 1990 issue of *Quimby's Boating Guide*.



The unofficial head of navigation on the Locust Fork, mile 406.8.

"CANAWLER" PRESIDENT

By David L. Kipp

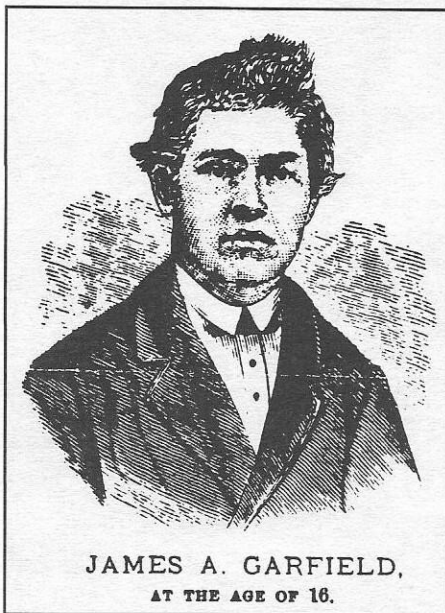
What brought together a 19th century author noted for adolescent novels and a martyred U.S. President? CANALS! As a sixteen year old boy, the future 20th US President James Garfield worked for a brief period of time in the 1840's as a mule driver on the canal systems of northeastern Ohio and western Pennsylvania. Following Garfield's assassination in 1881 after only four months in office, popular boys' books author Horatio Alger Jr. contributed to the usual spate of eulogizing books that follow the deaths of famous people with a biography titled *From Canal Boy to President*.

Although post-Depression generations of readers may not be familiar with Horatio Alger, he was enormously popular with the juvenile readers of the last quarter of the 19th century, writing over 130 'dime-novels' of the rags-to-riches genre. Frequenters of flea markets, antique sales and antiquarian book shops will often see the results of Alger's prolific pen as I did in coming across a copy of *Canal Boy*. For his novels, Alger drew on his experiences as social worker and 'father-confessor' at an asylum for homeless boys in New York City. Wanting to inspire his readers, the theme of his works was invariably that virtue and hard work lead to success. He had never tried biography until challenged to do so by a publisher interested in quick profits following Garfield's assassination. Garfield died September 19, 1881. Alger began writing on September 24th and finished October 8th. The book was published in time for the Christmas trade selling more than 20,000 copies. My copy of *Canal Boy to President* is inscribed with "Johnny from Papa, December 25th, 1881". As a frontispiece, this first edition has an attractive engraving of the young Garfield astride a horse pulling a canal boat along a rural stretch of a canal. A close-up of Garfield with the canal boat in the background is repeated on the front cover in bas-relief. Although a biography, its style is indistinguishable from Alger's novels.

Garfield was not the first in his family to have contact with Ohio canals. His parents emigrated from New England in 1820 and began farming in the Cuyahoga valley south of Cleveland. With the early success of New York's Erie Canal (even before it was fully completed), states like Ohio began canal projects to open their interiors and link the Great Lakes with the Ohio River basin. The Ohio & Erie was the easternmost of Ohio's 2 major north-south canals. It connected Lake Erie at Cleveland with the Ohio River at Portsmouth. Begun the same year that the Erie in New York was completed (1825), it was finished in 1832. Farmers near the canal route often contracted to dig sections and James Garfield's father Abram worked on several sections of the Ohio & Erie in the late 1820's before James was born.

During the time that James was growing up and helping his now widowed mother run the family farm, a private canal company had linked the Ohio and Pennsylvania canal systems together. A branch was dug from Akron on the Ohio & Erie Canal to Newcastle on a canal that ran from Erie, PA to the town of Beaver on the Ohio River where steam tugs would tow the canal boats on to Pittsburgh. This east-west connection finished in 1840 was called the Pennsylvania & Ohio Canal and provided the Cleveland to Pittsburgh connection soon to be the scene of Garfield's canalling adventures. This route carried raw materials from western lakeports bound for Pittsburgh and returned coal and manufactured goods.

Alger devotes a full chapter to Garfield's brief canal career. He observes that James was a good



student who read avidly, especially tales of adventure, travel and the sea. His imagination thus stirred, at 16 years of age he could take the farm routine no longer and against his mother's wishes, walked the 17 miles to Cleveland to seek a berth aboard a lake schooner. Rebuffed by a drunken schooner captain who mocked him as a country hick unfit for life at sea, he sought out his cousin Amos Letcher who captained a canal boat called the "Evening Star" on the Pennsylvania & Ohio Canal. Accepting his cousin's offer, he signed on as a driver at \$8 a month beginning in August 1848.

It was said that as canalling was at the bottom of sailing, so driving was at the bottom of canalling. Responsible to keep a team of two horses or mules moving on the tow path for two six hour stretches a day regardless of weather or gloom of night, a driver also had to feed the animals and rub them down after each shift and keep the tiny stable in the bow of the canal boat clean.

The driver was also responsible for insuring that the towlines did not get tangled when boats passed in opposite directions or a faster boat

passed a slower one. Garfield's inexperience resulted in he and his team being yanked into the canal several times before he 'learned the ropes'. It was during his canal days that he began to keep a journal that became a life-long habit. Here he records that in the 6 weeks he worked on the canal, he went overboard 14 times, each requiring rescue by his cousin, since he could not swim.

A canal freightboat would travel between 2 and 2-1/2 miles per hour and could make 50 or 60 miles per day depending on the number of locks to be negotiated. Garfield made four complete trips from Cleveland to Pittsburgh and at the end of his first trip, was promoted to bowman. A full crew on an Ohio canalboat consisted of the captain, 2 drivers, 2 steersmen, a bowman and a cook. In addition to keeping the bow lamps trimmed and operating, a bowman's job was to run ahead and prepare the locks for the boat, then get the boat into the lock and snubbed (stopping the boat before it crashed into the forward gates). As the vanguard of the crew, he often met other bowmen of boats coming from the opposite direction desiring to use the lock at the same time. The oft ensuing fistfights to determine who went first are what deservedly gave the canal era its brawling reputation. Being a strong farmboy, apparently Garfield held his own in these situations.

It may have been either the constant exposure to the elements or the 14 dunkings in the canal, but by October 1848, Garfield came down with the 'fever and ague' which kept him in bed at home for the winter. During this time, his mother convinced him to at least try higher education before returning to the canal. He took her advice and went on to become a college professor, Ohio State Senator, Major General in the Civil War, U.S. Congressman, a leader of the Republican Party and finally, and briefly, President of the United States.

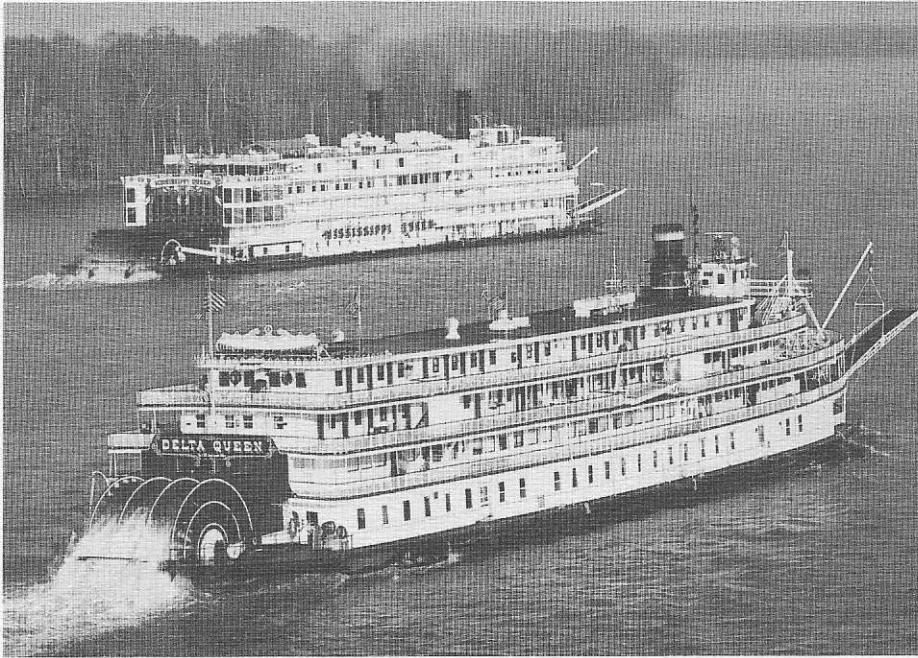
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THE CANAL BOY

STEAMBOATIN' THROUGH THE BARKLEY CANAL



The "Delta Queen" (foreground) and the "Mississippi Queen" now travel many of the navigable rivers of central USA.

By Bruce J. Russell

America's steamboat era reached its peak in the late 1870s when hundreds of the mammoth sternwheelers and sidewheelers with names like the NACHEZ and the ROBERT E. LEE plied the navigable rivers and lakes of the expanding nation, transporting people, animals, general cargo and mail. Prior to their eclipse by the faster and generally more reliable railroads the fire breathing, often ornate riverboats kept the lines of communication open between north and south bringing agricultural and industrial products to both Gulf and East Coast ports. MARK TWAIN in his epic work LIFE ON THE MISSISSIPPI told it all, of how the 200 to 350 foot long flat bottomed river craft took on millions of bales of cotton from the levees of Memphis, Vicksburg, and Natchez and moved it down the mighty Mississippi to hot, steamy, and boisterous New Orleans where it was transferred to schooners, barks, or even the graceful China Clippers to continue on to foreign shores.

The steamboats went everywhere the rivers were wide enough and deep enough to accommodate them. The principal arteries were the Mississippi from St. Louis to New Orleans, the Ohio from Pittsburgh to Cairo, Illinois where it joins the Mississippi, and in the East the lordly Hudson from New York City to Albany where narrow hulled sidewheelers were used almost exclusively. However in the 1850s, 60s, 70s and 80s there were other rivers which COULD have been used by the great steamboats had they been improved. Unfortunately they contained too many twists, turns, and bends or their depth wasn't adequate for even a flat bottomed boat with shallow draft to proceed without suffering hull damage from hidden rocks, or grounding on a mud bank. Ironically by the time the US Army Corps of engineers began planning to make them fully navigable for river craft the railroads and later the highways had taken away all of the potential business, both passenger and freight. As elegant and ornate as

the big wood burning steamboats of MARK TWAIN's day were, they couldn't earn enough income after 1890 to justify their continued existence and one by one they disappeared from the scene. Their spacious dining saloons may have rivaled the Great Hall of Versailles with its mirrors and chandeliers, their cuisine may have been fit for royalty, and their sleeping accommodations may have resembled something out of an Arabian Knights fairy tale, but gradually most people expressed a preference for train travel, especially with the advent of sleeping and dining cars. In the waning years of the 19th Century once affluent and bustling river ports up and down the Mississippi and Ohio, as well as the Hudson on the East Coast, became less important. Where several hundred boats once tied up at a levee now one or two a week became the norm. Soon busy places like the infamous NACHEZ UNDER THE HILL became a shadow of their former selves.

Prior to the TENNESSEE VALLEY AUTHORITY improvements of the 1930s the Tennessee and Cumberland Rivers, which pass through Chattanooga and Nashville respectively, flowed northwest to join the Ohio at Paducah, Ky. As part of its electrical generating scheme the TVA erected an imposing 60 foot high concrete dam about 10 miles east of Paducah, causing the water of both rivers to back up and form two gigantic lakes - Barkley and Kentucky. Each is over 150 miles long but only about 20 miles wide the broadest point. Water from these artificial bodies is permitted to flow through the dam's sluice gates to turn a row of turbines, creating electrical power. Both Lake Barkley, named after a famous politician of the Roosevelt years, and Kentucky Lake are enlargements of existing rivers. Nevertheless after their initial 120 miles both begin to narrow until they again become the Tennessee and Cumberland rivers. In the 1930s when Kentucky Dam was constructed under the WPA emergency manpower employment program this scheme was viewed as a major civic improvement.

An advantage of turning the western portion of the aforementioned rivers into lakes was that they

became fully navigable. Since the water level was raised almost 60 feet vessels which might have previously scaped bottom no longer had to worry. Large Mississippi River type steamboats which previously had been unable to reach Nashville or Chattanooga could now do so. The improvements were such that a paddle or sidewheeler could depart New Orleans and proceed up the Mississippi to Cairo, switching onto the Ohio. At Paducah in neighboring Kentucky it could enter the Tennessee and then travel the length of Kentucky Lake to ultimately reach Chattanooga, deep in the Smoky Mountains. On the other hand if the steamer desired to reach Nashville it would, almost immediately after leaving the great dam and lock complex, enter a new man made canal and travel for about 7 or 8 miles to the western extremity of Lake Barkley which gradually narrows to once again become the Cumberland River.

The scenic Cumberland in turn permits access to Nashville, country music capital of America. The original mouth of the Cumberland where it entered the Ohio was bypassed in favor of using the mouth of the Kentucky via passage through the man-made Barkley Canal.

Although the era of the passenger steamboat was long over when TVA rearranged the rivers in the Tennessee Valley, the planners still saw a need to improve inland waterway navigation in order to allow coal and chemical laden barges to reach TVA power plants and other industrial sites at the water's edge. TVA knew that water transportation, then as now, is the most economical and sensible way of moving bulk commodities. Consequently the digging of the Barkley Canal as a connecting link between Kentucky and Barkley Lakes was justified.

Kentucky dam is bypassed by a 58 foot lock which allows boats to get from the level of the Ohio and extreme western Tennessee River to the elevation of the two man-made lakes, which are approximately 60 feet higher. It was constructed by thousands of laborers during the Great Depression and used the same technology as Canada's recently opened Welland Canal locks. It took almost 10 years to design and build the combined lock and dam complex, and the cost was in the millions. While the concrete for the dam and lock were being poured, other workers were engaged in digging the Barkley Canal as part of an inland navigational route between the two artificial lakes. The actual excavation of the channel was done using steamshovels, but human hands installed the crushed stones or "rip rap" along the banks to prevent erosion.

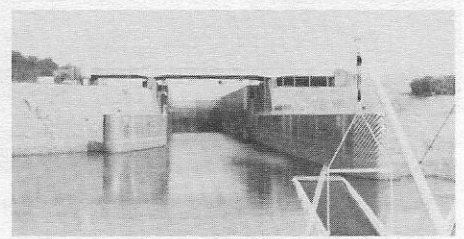
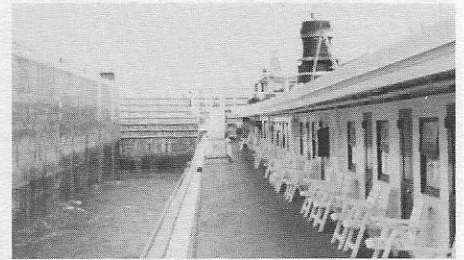
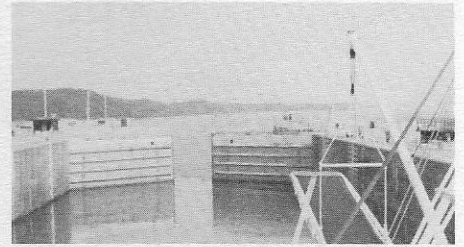
Unfortunately by the 1950s it was impossible to travel by passenger steamboat from Mississippi and Ohio ports such as St. Louis and Cincinnati to more remote destinations such as Chattanooga or Nashville because all of the companies had passed from the scene decades earlier. However after World War II a Cincinnati entrepreneur by the name of Tom Green purchased a 20 year old vessel known as the DELTA QUEEN from a California agent and brought her east to travel the Ohio and Mississippi Rivers, carrying tourists on pleasure cruises rather than pont to point journeys. His company known as the GREEN LINE was an old Cincinnati firm which had a long and colorful history. When Tom Green Sr. died in the 1930s his widow obtained a river pilot's license and proceeded to captain the line's boats herself. "MA" GREEN was a familiar sight on the Ohio River, poking her grey haired head out the wheelhouse to

wave to bridge tenders and other captains. The GREEN LINE had the distinction of running the last regularly scheduled trips on the entire Ohio-Mississippi system. These were tri-weekly overnight voyages between Cincinnati and Louisville, KY, and they persisted until 1938. The company continued offering day excursions from its headquarters city to various destinations on the Ohio. Nevertheless by 1945 its two steamboats, products of the late 19th Century, were in bad shape and soon would not be able to meet Coast Guard safety standards. TOM GREEN, now president of the line, had to acquire replacement tonnage or exit the business altogether.

THE DELTA QUEEN and its sister steamboat the DELTA KING were built in 1926 for use on the Sacramento River between San Francisco and the California state capital. Their reciprocating engines were manufactured in Scotland as were their hulls. Brought to the West Coast in disassembled form, they were put back together again and a wooden superstructure containing dining rooms, bedrooms, suites, parlors, and pilot house added. Although by 1926 the Southern Pacific RR as well as the Sacramento Northern interurban had captured almost all of the passenger trade between the two cities, the CALIFORNIA TRANSPORTATION COMPANY believed luxurious overnight boats offering exquisite dining and accommodations could still turn a profit. From 1926 until 1941 they did, but following Pearl Harbor the US Navy requisitioned both Delta boats for use as floating barracks in the Oakland area and elsewhere on

San Francisco Bay. They received a somber coat of grey and their opulent features were removed and placed in storage. Following the war's end the original owners had no desire to resume the overnight service and put both sternwheelers up for sale. TOM GREEN, seeing a bargain too good to pass up, bought the DELTA QUEEN at auction and had it shipped through the Panama Canal to New Orleans and ultimately Cincinnati where he spent over a million dollars refurbishing her for inland waterway and river cruising. He sensed that such trips, using old time Mark Twain era steamboats restored to their original appearance, would be an instant hit with the public. He was right. After the war people began to have more discretionary income and longer vacations, and the travel business began to boom. For 40 years the DELTA QUEEN has steamed along the Mississippi and its tributaries, creating a living link with the glory days of American riverboating. In 1976 the firm, now called DELTA QUEEN STEAMBOAT COMPANY rather than the GREEN LINE, acquired a second, much larger vessel which it christened MISSISSIPPI QUEEN. While possessing modern amenities, it still reflects the steamboat heritage. Nevertheless traditionalists still prefer the older DELTA QUEEN.

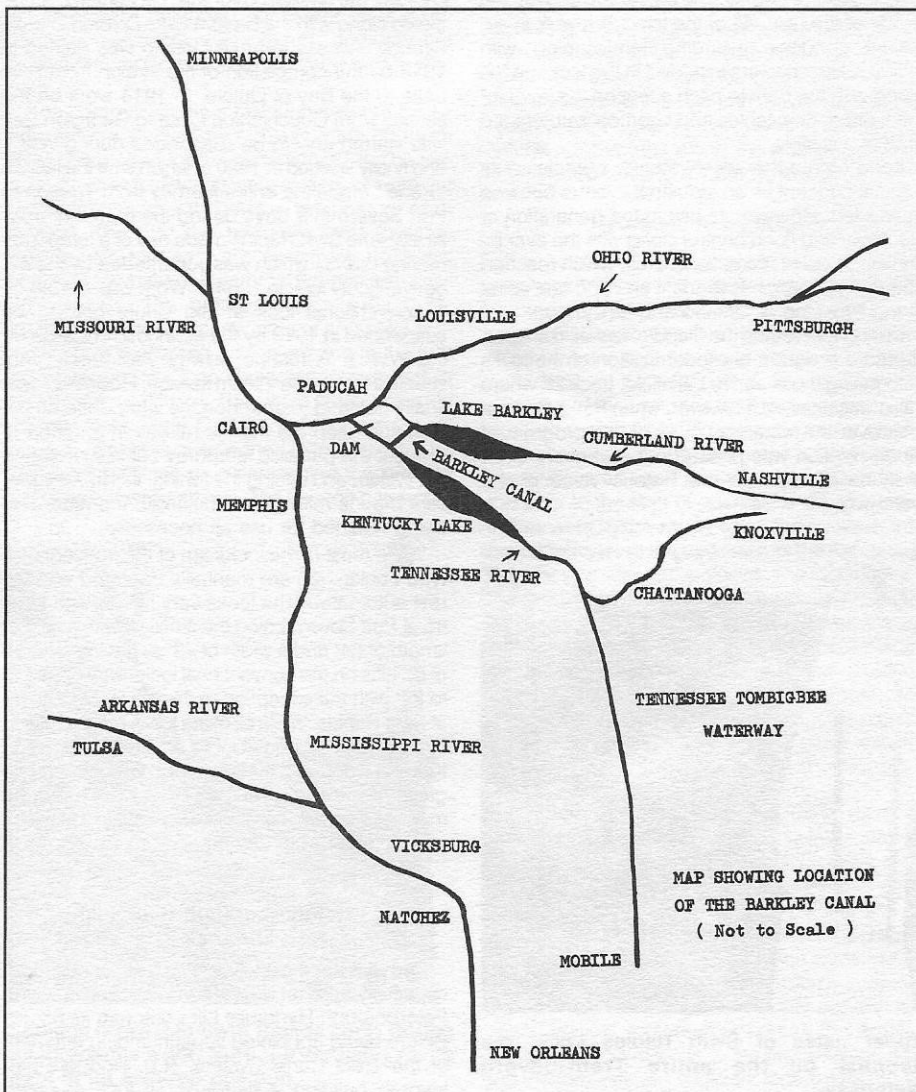
Three or four times a year the DELTA QUEEN leaves her usual Mississippi and Ohio River stopping grounds and ventures east into Kentucky and Tennessee calling at Chattanooga and Nashville. Passengers are therefore able to experience a passage through Kentucky Lock, in the process being raised about 60 feet. If they have chosen



Passing through the Kentucky Lock to be lifted 58 feet to the level of Lake Kentucky and the Barkley Canal. (Russell photos)

the Nashville cruise then they'll also be able to navigate the Barkley Canal which, like New York State's Cayoga-Seneca waterway, is truly an inter-lake passage. The Nashville cruise, marketed under the title "Wilderness Rivers" is one of the great river journeys of North America, passing through gorgeous territory replete with horse farms and Civil War battlegrounds. Both the Tennessee and Cumberland Rivers are much narrower than either the Mississippi or Ohio, making the trip through Bluegrass country even more exciting since one can practically speak to people on the shore. While steaming through the lakes small pleasure craft of many types are encountered as well as an occasional island. In addition there is no shortage of barge tows since the area is replete with coal mines and chemical works, not to mention power stations. Furthermore in Nashville is situated the National Bridge Company which, despite its name, builds barges in addition to bridges. Thus brand new barges on their way to the Mississippi are sometimes encountered by the DELTA QUEEN as it makes its way into America's heartland. Because she's the only large passenger carrying vessel to traverse either the Cumberland or Tennessee Rivers her visit to Kentucky Lock and the Barkley Canal is an event of considerable media attention. Upon arrival at the lock crowds of local residents are lined along the walls of the huge chamber to observe the 65 year old vessel being lifted from river to lake level or vice versa on the return journey. While the much larger MISSISSIPPI QUEEN can also negotiate these rivers the older boat normally does the honors.

Passage on the DELTA QUEEN's cruise to Nashville, which usually originates in St. Louis, can be booked through a travel agent or by contacting the company directly at their headquarters at Robin Street Wharf in New Orleans. For those who love canals and inland waterways and who also appreciate the sounds and smells of authentic steam engines turning giant paddlewheels, this journey is highly recommended. Bon Voyage!!!!



THE TRENT-SEVERN WATERWAY



The world's highest hydraulic lift locks at Peterborough.

By William L. Huber

The Trent-Severn Waterway provides a 240 mile, 8' deep channel between Lake Ontario and Georgian Bay bisecting the Province of Ontario in Canada. Using a series of lakes and rivers along with connecting man-made canals and 44 locks the waterway took 87 years to complete being surpassed, in that respect, only by the Corinth Canal in Greece.

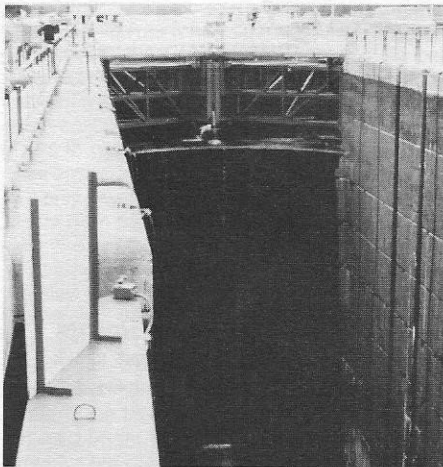
Starting at Trenton at the mouth of the Trent River, on the Bay of Quinte, an arm of Lake Ontario, the waterway follows the Trent River through rich farmland to Rice Lake which cuts across to enter the Otonabee River whose course it follows to Lakefield. Here it enters the Kawartha Lakes, now a popular resort area, with such exotic names as Katchewanooka, Clear, Stony, Lovesick, Buckhorn, Pidgeon, Sturgeon, Cameron, and Balsam to the summit via 35 locks with a total lift of 597' in 160 miles. From Kirkfield, at the summit, the waterway descends via Mitchell and Canal Lakes, the Talbot River, and a canal to Lake Simcoe at Gamebridge. From here an open water crossing of Lake Simcoe leads to Orilla and Couchiching Lake followed by Sparrow Lake and the once wild Severn River passing through the rugged territory of the Canadian Shield before reaching Port Severn on Georgian Bay and Lake Huron for a total drop of 263' in 80 miles via 9 locks.

The conventional locks from Lock 1 at Trenton to Lock 26 at Lakefield are all manually operated by the locktender pushing the bar handle of a capstan while walking in a circular motion. The sluices are operated by winches located on top of each gate. Due to the increase in pleasure craft using the canal in recent years it became necessary to electrify the remaining locks in order to speed up transit over the more popular stretch of the waterway. The most spectacular locks are the lift locks at Peterborough and Kirkfield followed by the conventional lock at Swift Rapids with its 47' lift and double set of radial gates at its upper end. Lock 44 at Big Chute is most unique since it consists of a marine railway so designed that the

cradle always remains level regardless of the grade of the rails. All of the locks are kept in excellent condition including landscaping with facilities and showers included in the lockage fee along with the right to pitch a tent on the lawn for the night. Picnic tables and charcoal burners are always available.

Long before the waterway was completed its original concept as an industrial avenue became outmoded. However its use in the generation of electricity and flood control along with the ever increasing load of recreational craft, which reached 250,000 in 1985, has made it an important asset to the Province of Ontario and of Canada.

During the 1960's the Department of Transport started a program of modernization of the locks automating those above Lakefield, Lock 26 where traffic was heaviest. However, when Parks Canada took over the waterway in 1972 this program of modernization was phased out and every effort is made to maintain the historic value of the waterway.



Upper gates of Swift Rapids Lock, the deepest on the entire Trent-Severn Waterway.

In the early part of the 19th century farmers and lumbermen of the area looked to a waterway as the only practical way to transport their produce and logs in that remote, roadless expanse which led to the piecemeal construction of the waterway with the first lock, in 1833, at Bobcageon connecting Sturgeon and Pidgeon Lakes. There were a number of resorts on these lakes and steamboat lines soon prospered serving the resorts. From 1833 on locks were built locally at Scott's Mills, Hastings, and Glen Ross. Many dams and timber slides were built by the lumbering industry which was generally opposed to the canal concept. A lock at Lindsay briefly permitted access to Scugog Lake from Sturgeon and Pidgeon Lakes. After this brief flurry of lock building nothing further was done for many years until after Confederation in 1867 after which the Federal government took over construction of the waterway. Between 1883 and 1887 the lock at Lindsay was reopened to again permit navigation to Scugog Lake, and Young's Point and Rosedale locks were built, the latter connecting Balsam Lake with Cameron Lake. Locks were built at Burleigh Falls, Lovesick, Buckhorn, and Fenelon Falls during the 1880's connecting the Kawartha Lakes and giving continuous navigation from Lakefield to Port Perry on Scugog Lake.

Between 1895 to 1904 the stretch from Lakefield to Peterborough was completed with the opening of the Peterborough Hydraulic Lift Lock in 1904. By 1907 the Kirkfield Hydraulic Lift Lock was completed along with the Balsam Lake Division to Lake Simcoe. Access to Lake Ontario was gained in 1918 by the completion of the stretch from Rice Lake to the Bay of Quinte. In 1914 work on the section from Couchiching Lake to Georgian Bay was started only to be suspended during WW 1 and finally finished in 1920 at which time the launch "Irene" made the entire journey from Trenton to Port Severn in 9 days during the month of July. At that time Swift Rapids made use of a temporary marine railway which was superseded by the 47' conventional lock in 1964-5. Work was started on a conventional lock at Big Chute only to be suspended in 1919 by the economic crisis following WW 1. A marine railway was hastily constructed to provide interim service. However it was finally decided to abandon the work done on the lock and keep the marine railway in an effort to prevent the parasitic lamprey eel from entering the system and ruining the fishing. In 1977 the present marine railway was built with the older one being retained for use as necessary.

While most of the locks are of the conventional type Locks 1-26 are manually operated with the rest automated. The locks vary in size with Lock 45 at Port Severn being the smallest with a usable length of 84' and a width of 23' all having a depth of 8'. Lifts on the conventional locks vary from 3.5' to 27' with the exception of the 47' lift of Lock 43 at Swift Rapids. While all of the locks are interesting it is the two hydraulic lift locks at Peterborough and Kirkfield along with the 47' lift and the upper rotary gates of the Swift Rapids Lock, and finally, the marine railway at Big Chute which make this waterway different from any other.

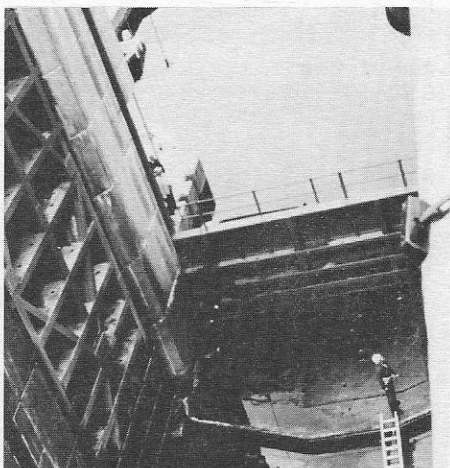
The Peterborough Hydraulic Lift Lock

Perhaps the most interesting lock in the world, especially from an engineering standpoint, is the Peterborough Hydraulic Lift Lock with its 65' lift. Before being appointed superintending engineer of the Trent Canal System, R.B. Rodgers had favored building a hydraulic lift lock at Peter-

borough because of the height of the lift. While there were only three such locks in the world at that time, Anderton Lift in England built 1870-5, L'ascenseur des Fontinettes in France built in 1887, and L'Ascenseur numero un in Belgium built in 1884-8, there were sound reasons for such locks in spite of the increased costs. The 65' lift at Peterborough would have required five or six conventional locks. Since a conventional lockage uses about one lock of water per lockage and a hydraulic lift lock virtually none there is the water conservation factor. A flight of five or six locks would require a minimum of one hour to transit while a hydraulic lift lock takes about 10 minutes. Finally a conventional lock can only accommodate one way traffic versus two way traffic on a hydraulic lift lock per lockage.

When R.B. Rodgers returned from a study of the three European locks in 1886 he had decided on using concrete and steel for the construction instead of the masonry and cast and wrought iron then in use. Since Canada, at that time, had very little experience with concrete construction Rodgers built several of the Trent canal locks out of concrete thereby gaining valuable experience and proving the superiority of that type of construction. In 1896 the Ottawa firm of Corry and Laverdure, in spite of having no prior experience in canal building, was awarded a somewhat vague contract to construct the foundation and towers out of solid, unreinforced concrete. Each of the three towers alone was 25' x 30' x 100' tall from bedrock while the breastwork was 40' thick, 80' high, and 126' long, all of solid concrete except for the Hunter Street tunnel, a power house room, and a compressor chamber. Altogether 26,000 cu. yards of concrete was poured, probably the largest monolithic concrete structure built to that date.

The contract for the metal work went to Dominion Bridge whose low bid was \$244,000 with steel being used for the superstructure. The two main presses (cylinders) were of steel as were the two caissons and eight gates — two pairs for each caisson. The 7½" dia. hydraulic rams (pistons) weighed 120 tons each and were made up of cast iron sections bolted via internal flanges with copper gaskets. The presses, which extend 75' through rock, were constructed of cast steel sections which presented a problem due to the 600 PSI pressure, since no Canadian foundry could be found to cast them. They were finally provided by the Penn Steel Casting & Machine Co. of Chester, Pennsylvania in the United States. The 12" dia. crossover pipe connecting the presses was made of wrought iron. The caisson gates con-



Looking down into Swift Rapids Lock, during maintenance work. Note the vertically rising gate in its lowered position.



The "Kawartha Voyager" on which the canal buff may ride the entire length of the Trent-Severn Waterway, end to end, in eight days. (Courtesy of Walter Meseck)

tained air chambers to lighten them and were hinged at the bottom to lie flat on the bottom of the reaches when opened. The gates on the caissons slid into grooves on the ones on the reaches with both operating as a unit into the reaches. Rubber seals were used to make the gates watertight. To insure a watertight fit between the caisson and the reach a 1-3/4" gap was provided in which an inflatable rubber tube along the sides and bottom was inflated making a watertight seal.

Hydraulic Accumulator

The hydraulic accumulator consisted of a heavily weighted 20" dia. ram (piston) having a 30'-6" stroke in a cylindrical press located in the east tower. Hydraulic turbines, operated by the 65' head of water kept the water pressure in the accumulator at 650 PSI. The accumulator was necessary to compensate for leakage in the presses and to make adjustments in the heights of the caissons. At the start of the season the accumulator was used to raise one caisson to the top prior to the start of operations. All of the auxiliaries were hydraulically operated by water from the canal making the operation of the lock virtually automatic and self sufficient. The lockmaster in the control cabin operated the main crossover valve to the rams and the valves to the accumulator. One man on each caisson was needed to operate the hydraulics controlling the gates and to inflate the sealing tube. The original cost of the Peterborough Hydraulic Lift Lock came close to \$500,000 which brought on the usual criticism resulting in the resignation of H.B. Rodgers in March, 1906.

In 1963-4 most of the hydraulics were scrapped leaving only the caissons, rams, presses, and accumulator as originally installed. The joints of the caissons, which carry 1,700 tons of water, (twice that of the European lifts) were welded and the whole zinced. New rollers replaced the original sliders on the towers which keep the caissons from rotating. New aluminum gates replaced the steel ones operating in the same manner but with new seals. Electric motors now control the auxiliary equipment, including water to the accumulator, making the formerly self sufficient lock subject to the

vagaries of electrical operation. Finally a new control cabin was constructed on the top of the center tower of the upper reach with an elevator shaft being driven through the solid concrete to connect the control tower with the pump room in the breastwork.

The Operation of the Lock

When all is ready the operator in the control tower opens the crossover valve permitting the heavier upper caisson to raise the lighter, lower caisson as it descends. As the rising caisson approaches the upper reach its gate slides into grooves on the reach gate making the two operable together. The same thing happens on the lower caisson at the lower reach. Travel stops when the water in the upper caisson is one foot below the water in the upper reach at which time an extra foot of water, weighing 144 tons, is let into the caisson bringing its level to that of the reach and increasing the pressure in that ram to 580 PSI. At the lower level that caisson stops with its water level one foot above that in the reach whereupon it is discharged into the lower reach until both are level at which time the gates are opened into the lower reach. The pressure on the lower ram is now reduced to 534 PSI. After the boats in the caissons have left and others going in the opposite direction have entered the gates are closed and the operation repeated. A normal lockage takes about 10 minutes with the record requiring but 6½ minutes and uses virtually no water other than the extra foot used to drive the caissons. In the winter both caissons are stored at the lower level via the accumulator.

Swift Rapids Lock

The Swift Rapids Lock is in a rather isolated area and was originally served by a marine railway built in 1920 and replaced by the present lock in 1964-5 with a lift of 47', the highest conventional lock on the system, and is unique in several ways. The lower gates have a vertical lift gate outside which can be lowered from its stored position overhead to dewater the lock for servicing. The floor of the
(Concluded on Page Twelve)

TRENT-SEVERN WATERWAY

Pier Pressure

(Concluded from Page One)



The hydraulic lift locks at Kirkfield.

(Concluded from Page Eleven)

lock is pierced by a grid of large holes angled 30° to each other and leading to a sub-floor beneath into which the water enters via one radial sluice valve. The water is so disbursed by the angled holes that the lock can be filled in 8 minutes with the 1.5 million gallons of water required, for a lockage without turbulence. A similar valve releases the water into the river in the same manner. Two sets of radial gates are provided at the upper end for safety. These gates can be opened or closed by means of manually operated hydraulic pumping should the power fail. Radial gates differ from swing gates in that they are not subjected to the water pressure, it being equalized, and can be opened at any time. There is a large power plant adjacent for the generation of electricity.

Kirkfield Hydraulic Lift Lock

The Kirkfield Hydraulic Lift Lock is situated in a somewhat isolated area at the end of the long cut leading from Balsam Lake, at the summit, to Canal Lake. Having a lift of 49', it was built from 1900 to 1907 and operates in a manner similar



"Big Chute", with a boat in the cradle going "over the hump" on the way down to the lower level.

to the Peterborough Lock. This lock was patterned after the one near La Louviere, Belgium, and differs from the one in Peterborough in that it uses steel construction to guide the caissons instead of poured concrete and depends solely on electric pumps to maintain pressure in the rams instead of using an accumulator. The contract was awarded to Dominion Bridge for \$297,300 and the lock opened on July 6, 1907. In the mid-1960's the lock received renovations with the steel aqueduct over the road being replaced by one of concrete and the manual controls being electrified. This lock may be reached by detouring on Route 503 from Rt. 48 at the town of Kirkfield.

Big Chute Marine Railway

Prior to WW 1 work was started on a dam and locks at this site where the Severn River rushes through a chute in the pre-Cambrian granite, only to be stopped by WW 1 at which time a small marine railway was built in 1917. The idea of a conventional lock was dropped in an effort to prevent the passage of the parasitic lamprey eel into Lake Simcoe and the present large marine railway was built in 1977 to overcome the 58' drop. The old railway remains as a back-up.

The new railway has been so designed that its cradle remains horizontal at all times except at each end where a small grade facilitates loading and unloading. This was accomplished by having 2 sets of rails on each side and having one set of wheels gauged to the inner rails and the other set gauged to the outer rails. The cradle is fitted with legs to the wheels so that it is kept clear of the rails at all times. When the cradle ascends a grade the rear wheels ride on the set of rails which rise above the other set thereby keeping the cradle horizontal. At the summit the both sets of rails are on the same level and in going down they reverse their grades so that the leading wheels ride higher. Straps keep the boats on an even keel during transit. There is also an electric generating plant adjacent which was built privately in 1911 and was the first plant under public ownership in 1914.

Engineers ramps on the Tenn-Tom are equipped with docks, a welcome innovation. The one at Memphis, however, is not, and I was obliged to give it a miss. I don't know why the corps made an exception of this particular ramp, or what it would take to persuade them to make up the lack, but it is in any case a lack which even a small, poor village could correct as a self-help project.

A few years ago, cruising the Arkansas River, I was amazed and appalled to discover that the Corps of Engineers Visitor Center at the dam in Russellville was inaccessible to visitors traveling by water. As if to underline the corp's inhospitality to boaters, there were small-boat docks within easy walking distance of the center, but they were all reserved for the corp's own boats. I wrote to them, pointing out the anomaly of a waterway visitor center closed to waterway visitors, and I received a friendly reply, thanking me for the suggestion and promising to look into the matter. When I recently found myself passing Russellville in a car on I-40, I took a detour to the Visitor Center and made a follow-up inquiry. No, I was told, nothing had been done, because there was simply no demand for access by boaters: I was the only person who had ever shown an interest.

I would be willing to bet that the corps never got a letter from a motorist asking them to put a parking lot there, or thanking them for having done so. They just naturally went ahead and did it because people building to attract tourists think of motorists and don't think of boaters. We boaters can sulk about the unfairness of this if we like, but it won't do us any good. What we need to do is make ourselves visible and audible. Next time you pass a river town where you couldn't stop if you wanted to, make a note of it, and when you get home, write the mayor, the chamber of commerce, the newspaper. Let them know that you were there, but couldn't bring your tourist dollars ashore because there was no place to land. When you pass a river town that has a public dock, write and thank them. With a little such conditioning of community developers, America's inland waterways could become a lot more user-friendly.

CANAL CALENDAR

March 17, 1990 — Ninth Annual Canal History and Technology Symposium, William Simon Business Center, Lafayette College, Easton, PA. Contact: Canal Museum, P.O. Box 877, Easton, PA, 18044.

April 21, 1990 — Justice Douglas Hike on the C. & O. Canal. Contact: Sandra Hemingway (day), (202) 393-3306 or Hal Larsen (703) 356-1809 for details.

April 27-29, 1990 — Virginia Canals and Navigations Society 13th Annual Meeting, historic building tours, and batteau rides. Best Western Hotel, Petersburg, VA. Contact: Bill Trout, 35 Towana Road, Richmond, VA 23226.

April 27-29, 1990 — Spring Field Trip, Pennsylvania Canal Society. The Lower Delaware Canal. Contact: Jill & Emil Gombosi, P.O. Box 382, Mechanicsville, PA 18934.

May 12-13, 1990 — Spring Tour, the Canal Society of Ohio, of both the Ohio and Erie Canal and the Pennsylvania and Ohio Canal, near Akron, Ohio. Contact: Larry Turner at 11619 Frazee Road, Doylestown, OH 44230.