

DREDGE CINCINNATI (Dredge Kanawha)  
Pittsburgh Vicinity  
Allegheny County  
Pennsylvania

HAER No. PA-345

HAER  
PA  
2-PITBUV,  
4-

PHOTOGRAPHS

WRITTEN DESCRIPTIVE AND HISTORICAL DATA

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HISTORIC AMERICAN ENGINEERING RECORD

DREDGE CINCINNATI  
(DREDGE KANAWHA)  
HAER No. PA-345

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PA  
2-PITBUV  
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Location: Docked on the Ohio River at the foot of Lighthill Street, North Side, Pittsburgh, Allegheny County Pennsylvania. (Since the completion of the project, the dredge has been sold and is reportedly docked near Sewickley, Pennsylvania).

Date of Construction: 1915

Builder: M.A. Sweeny Shipyard of Jeffersonville, Indiana, for the Cincinnati District, U.S. Army Corps of Engineers

Owners: 1915-1941, U.S. Army Corps of Engineers; 1941-1943, Zubik Towing Company, Pittsburgh, PA; 1943-1993, Monongahela & Ohio Dredging Company, Pittsburgh, PA; Ron Grimm, Sewickley, PA

Present Use: Vacant/Not in use

Significance: The Cincinnati is a "dipper dredge," particularly suited to the shallow, rocky conditions of American inland waterways. The dredge operated for 78 years on the Ohio River and its tributaries. The Cincinnati was part of federally funded waterways improvement projects developed to enhance the economic viability of American rivers in the nineteenth and twentieth centuries.

Project Information: The Dredge Cincinnati Project was sponsored in the summer of 1993 by the Office of History, U.S. Army Corps of Engineers. The project was assisted by Martin Reuss, Senior Civil Works Historian, Office of History, U.S. Army Corps of Engineers; Don Frankenberry, M&O Marine Construction, Pittsburgh, Pennsylvania; and Harry Young, and the Historical Construction Equipment Association, of Canfield, Ohio.

Historian: Francie Robb

Dredging, the act of deepening a water channel, is hardly a glamorous endeavor. This specialized activity, however, performs an invaluable service to navigation. The distinctive conditions of American waterways, including shallow, rocky ground, created a need for a new type of excavation machine in the nineteenth century, the dipper dredge. The work of these dredges dramatically changed American waterways. The dredge Cincinnati, built by the U.S. Army Corps of Engineers in 1915, was typical of numerous dipper dredges built in the late nineteenth and early twentieth centuries.<sup>1</sup> Although this boat was conventional in its style, it remained in service for an extraordinary length of time. Throughout its existence, first owned by the Army Corps of Engineers and later by a private company, excavation by the dredge Cincinnati enhanced the commercial value of the Ohio River system.

Although the Ohio River and its tributaries present a natural transportation system, travel was hampered by the shallow depths of the river. Between Pittsburgh, Pennsylvania, and Cincinnati, Ohio, the Ohio River varied in depth from one foot to occasional pools thirty feet deep. The average low water depth limited the size of boats that could be used on the river. Seasonal low water stages also severely constrained the river shipping season. Developing ways of deepening the shipping channel was of primary importance to residents along the rivers who depended upon the steady flow of goods. Despite this interest, however, river dredging in America remained a major engineering obstacle until the nineteenth century.<sup>2</sup>

In the nineteenth century the U.S. federal government financed numerous waterway improvement projects under the supervision of the U.S. Army Corps of Engineers. In order to execute this new responsibility the Corps increased the size of its fleet. Dredge boats were an important component of this expanded fleet. Among the new ships was the dredge Cincinnati, commissioned by the Cincinnati District of the Army Corps of Engineers in 1915. This dredge operated on the Ohio River system from 1915 until the 1970s, first under Corps management and later owned by a private dredging

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<sup>1</sup>Originally named the Cincinnati, the dredge was renamed the Kanawha when owned by the Monongahela and Ohio Dredging Company. For clarity in the paper, the dredge is referred to as the Cincinnati except for the specific section detailing its history with the Monongahela and Ohio Company, when it is referred to as the Kanawha.

<sup>2</sup>Leland R. Johnson, The Headwater District: A History of the Pittsburgh District, U.S. Army Corps of Engineers (Washington, D.C.: GPO), 79.

company, and renamed the Kanawha.

In its lifetime the dredge Cincinnati helped to increase the depth of the Ohio River, build the locks and dams of the Ohio River, and maintain the river channel. The dredge also worked for private companies aiding their use of the river by digging harbors, clearing out landings, and building wharfs. Furthermore, the dredge allowed companies to bury gas pipelines and telephone wires underneath the river. All of these jobs helped to make the rivers more useful to the development of the regional industrial economy.

The dredge Cincinnati was a dipper dredge, an American invention designed to meet the conditions presented by American rivers and lakes. In general, underwater excavation mandated the invention of new machinery to accomplish the task. Although the earliest dredging machines were invented by the Romans and Phoenicians, new improvements in dredges were invented in Europe after 1400. Most of these designs were made for harbor work.

Dredges differ in how material is raised from the bottom and in their suitability to different bodies of water. The two main classifications are hydraulic and mechanical dredges. The hydraulic group includes the suction dredge, draghead, cutterhead, and hopper dredge. Mechanical dredges include the bucket dredge, ladder dredge, grab bucket, and dipper dredge.<sup>3</sup>

By the 1600s, the ladder or bucket dredge was readily used in Europe. Typically, a bucket dredge employs a chain of buckets raising silt, which is dumped onto a chute and into an accompanying barge. The grab bucket dredge employs a grab crane, such as a clamshell bucket, placed on the vessel. This type of dredge was particularly well suited to digging accurately, in narrow corners and along walls.<sup>4</sup>

Since the state financed most European dredging projects, typically for harbor maintenance and improvements, the ladder or bucket dredge was suitable to this type of dredging. It was well-adapted to the soft bottom of most harbors, and state governments

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<sup>3</sup>Rolt Hammond, Introduction to Dock and Harbour Engineering (London: Thomas Nelson and Sons, Ltd., 1958), 57-58; Ir. A. Roorda, Floating Dredges (Haarlem, The Netherlands: The Technical Publishing Company H. Stam N.V., 1963), 13-23; "Dredges and Dredging Operations," International Marine Engineering 20 (June 1915), 238; John Huston, Hydraulic Dredging: Theoretical and Applied (Cambridge, MD: Cornell Maritime Press, Inc., 1970), 3-5, 15, 21.

<sup>4</sup>Roorda, Floating Dredges, 13-15.

could afford the high cost of the large, stationary dredging plants used in harbor work.<sup>5</sup>

Although the technical means to dig underwater had been mastered in Europe, these dredges were inappropriate as river dredges in the United States. A dredging machine suited to American waters required a shallow draft, so it could be used on shallow inland waterways. It also had to be easily moved from location to location for river dredging, be able to dredge a variety of material, and, since much river dredging was done by private companies, the machine had to be reasonably priced.

For many years Americans met dredging needs by modifying land excavation techniques to aquatic situations. While early attempts included the use of horse and ox to pull plows in shallow water, by the 1820s the Army Corps of Engineers was experimenting with "scraper" dredges, used primarily in harbor dredging. Designed to stir-up sediment in order to allow the current to wash it down stream, these "drags" as they were often called, were pulled behind steamboats. These attempts had serious limitations, including limited digging depth, limited range, and the need for a low bank.<sup>6</sup>

By the late 1820s American civil engineers were designing steam powered bucket dredges which acted like giant shovels capable of moving up to 300 cubic yards of material a day. Usually attached to steamboats, flat bottom barges, and even schooners, these machines often malfunctioned and were underutilized due to their exorbitant cost.<sup>7</sup> Over time, this type of dredge, called a dipper dredge, evolved into a more complex machine, and by the 1870s it was the most common dredge type in the United States. This dredge was popular because it was particularly well-suited to

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<sup>5</sup>(Untitled) International Marine Engineering 16 (1911), 208.

<sup>6</sup>Johnson, The Headwater District, 79; "Dredges: Their Construction and Performance," Congress Paper 38, in Transactions. International Engineering Congress, (NY: American Society of Civil Engineers, 1905), 271-272, 278-279; John Thompson and Edward A. Dutra, The Tule Breakers: The Story of the California Dredge (Stockton, CA: The Stockton Corral of Westerners, University of the Pacific, 1983), 36; "15-Yard Dipper Dredge," International Marine Engineering, 15 (May 1910), 179-183.

<sup>7</sup> For a discussion of early dredging technology see: Walter McGehee Lowrey, "Navigational Problems at the Mouth of the Mississippi River, 1698-1880" (Ph.D. diss., Vanderbilt University, 1956), 131-184; and Ronald B. Hartzler, To Grant and Useful Purpose: A History of the Wilmington District U.S. Army Corps of Engineers (Washington, DC: US Army Corps of Engineers, 1984).

rocky, hard bottom digging, and could operate in a confined space. Furthermore, its versatility and low draft made the dipper dredge well-suited to use on the inland river system.<sup>8</sup>

The large civil engineering projects undertaken in the early twentieth century demanded a larger and improved dipper dredge. Steel hulls replaced old wooden or iron hulled vessels and wire rope replaced chains. Larger buckets were installed, and in general, dredge building became a specialized area of ship construction. These new dredges were a critical component to improving navigation on American rivers, the Great Lakes, and in the building of the Panama Canal.<sup>9</sup>

The main components of a dipper dredge--hull, hoisting engine, swinging machinery, spuds, boom, and dipper--all contributed to the excavation process. There were two main types of dipper dredges, the crane-style and the A-frame, differing in how the boom is attached. A-frame dredges were introduced in the 1870s, and were particularly adapted for digging levees and raising embankments. The A-frame dredges had a frame structure attached to the deck of the dredge and cables attached to this frame held the boom in position. After 1900 the A-frame was the more typical style constructed. On a crane-style, like the Cincinnati, the boom was attached directly to the roof and deck of the boat. The hinged pins and turntable gave the boom motion to the right and left side of the ship. Most crane-style dredges controlled the lateral motion of the boom through a swinging cylinder.<sup>10</sup>

Attached to the boom was the dipper stick, the extended shaft of the bucket. The shipper shaft on the boom held the controlling mechanisms of the dipper stick, including brake, axle and pinion gears. The inside edge of both sides of the stick was notched with teeth, which matched the pinion gears. A saddle block was then attached to the axle between the pinion gears and ran up through the slot in the dipper stick. The saddle block included a set of rollers, sometimes called "cat heads," at the top of the stick to hold the stick down on the pinion gears, keeping it in place. The

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<sup>8</sup>Thompson and Dutra, The Tule Breakers, 36; John Thompson to Harry E. Young II, July 12, 1993.

<sup>9</sup>"Dredges," in Transactions, 273-274; "Dredges and Dredging Operations," International Marine Engineering, 20 (June 1915), 239, 247, 254-256; Roorda, Floating Dredges, 15; John Thompson to Harry E. Young II, July 12, 1993.

<sup>10</sup>Don P. Frankenberry, President M & O Marine Construction, Inc. Interview with author, March 16, 1994; John Thompson to Harry E. Young II, July 12, 1993.

bucket was attached to the end of this stick."<sup>11</sup>

Spuds were a unique but critical component of the dipper dredge. Typically a dredge had three spuds, one at the rear, and two in front. Although some of the larger dredges had steel encased wooden spuds, more typical were the spuds on the Cincinnati. These spuds were made of tall blocks of wood, with steel angles protecting the corners. When a dredge was positioned, the spud brakes were released, and gravity pulled them to the bottom of the river.

The Cincinnati had pulleys on the top of its front spuds, with a wire rope connected to the bottom of the spud. This wire, which wrapped around the top pulley, down to the bottom of the pulley, and back to a pulley set built within the hull of the ship, was called the pick-up wire. The second set of wires, the pin-up wire, went around the sheaves over the top of the spud, down the side and was attached to the boat. This pin-up wire was pulled in order to force the boat up when the spud was forced into the ground. This put the dredge in a very rigid position, and added to the speed and reliability of the dig. It also gave the dipper greater force on the downswing than a grab bucket dredge, which made the dipper dredge better suited to working rocky and hard soil. Both the pick-up and pin-up wires were operated with the double-drum spud engine.

Although dipper dredges had two engines, the main or hoisting and spud engines, these were used to operate the machinery of the dredge, not for propulsion. Like most dredges, dipper dredges were not self-propelled, and required a tow boat to move them to a work area. Once in place, a dipper dredge, unlike other dredges, could manipulate the front spuds and bucket to "walk" and pull itself into digging position.

It took four people to operate a dipper dredge--an operator, a dipper tender, a fireman, and a deck hand. To prepare for a dig the operator would move the boom into position, using the swinging engines, hoisting motor and backing wires, all controlled from his position on the main deck. The dipper tender, or craneman, was responsible for releasing the brake on the dipper stick, which sent the stick straight down. The operator then used the backing wire to pull the shovel past the vertical point, "under" the hull. The dipper tender was responsible for the depth of the dipper stick. A common means of tracking the depth was to paint marks on the stick to determine the proper depth. Once the stick was set for the dig, the operator would maneuver the wires connected to the main engine pulling the bucket forward. With a filled bucket, the

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<sup>11</sup>Don P. Frankenberry Interview with author, March 16, 1994.

boom was raised, and the dipper tender opened the door on the bucket.<sup>12</sup>

Originally, the latch on the bucket door was released by a hard tug on a rope. The dipper tender was responsible for pulling in the slack on the rope and releasing the latch and dumping the material. The dipper tender pulled the rope through the water, making his a wet and sloppy job. This hand-controlled rope was replaced on the Cincinnati with a steam valve in the 1950s. After the material was dumped, the dipper stick and bucket were repositioned for the next dig. Typically, one dig cycle was completed in less than one minute. Although the operator was the boss of the operation, the two men needed to work well together in order to maintain a regular, steady dig pace.<sup>13</sup>

The fireman tended the dredge boiler, which produced the steam to operate the engines, and was also responsible for watching the stern spuds when the dredge "walked" forward. The deck hand was responsible for a variety of tasks, including operating the front spuds and performing the menial jobs on the dredge. In addition, when a new refuse barge was needed, the fireman, tender, and deck hand moved an empty one into position.

The flexibility and versatility of the dipper dredge led to its success in the United States. Simply by changing the dipper bucket one vessel could excavate a wide range of material. Operator and tender also had great control of the bucket and could get rocks and boulders out of the water. An additional advantage of the dipper dredge was the relatively small crew size required. An operator, dipper tender and several support personnel were all that was needed. Furthermore, dipper dredges could be built in a variety of sizes, depending on the size of job and finances. Most of the dipper dredges built in the United States before 1915, for example, had dipper buckets of two-cubic-yards or less.<sup>14</sup>

Before the 1880s, most dredges were owned by private dredging companies. As the federal government increased its involvement in river and harbor improvements at the end of the nineteenth century it commissioned more dredges. Many of these new dredges were considerably larger than their predecessors. Included in this group was a four-cubic-yard dipper dredge built for the U.S. Army Corps of Engineers for use on the Great Lakes, and a seven-cubic-yard dredge operated by the Montreal Harbor Commission. Both the

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<sup>12</sup>Don P. Frankenberry Interview with author, March 16, 1994.

<sup>13</sup>Don P. Frankenberry Interview with author, March 16, 1994.

<sup>14</sup>"Dredges," in Transactions, 281-283.

New York Harbor and Boston Harbor claimed to have the largest dipper dredge in service, with fifteen-cubic-yard dipper buckets. The New York dredge, Onondaga, had a length of 140', 50'-beam, and was built to excavate 50 to 55 feet underwater. Similarly sized dipper dredges were also built to dig the Panama Canal. All of these were A-frame style dipper dredges.<sup>15</sup>

In comparison to these large dredges, the Cincinnati was a modest dredge. Designed to work on the Ohio River the Cincinnati was 112' long, 34'-beam, with a draft of only three feet. The dipper bucket was two and one-half-cubic yards and made of manganese steel. The boom had a length of almost 25'. Its engines were steam powered and the main engine was capable of creating 150 lbs. of pressure. The fire-tube boiler used coal and purified river water. The main engine had 12" cylinders and 16" stroke. Originally, the minimum dredging depth was 6.5 feet and the maximum was 18 feet.<sup>16</sup>

#### U.S. Army Corps of Engineers and Ohio River Improvements

Although the U.S. Army Corps of Engineers had been called on to improve the Ohio River and its tributaries since 1824, most of this early work was limited to the removal of snags obstructing navigation, with some dredging of bars and shoals. As was the case with most antebellum transportation systems, federal funding for these improvements was sporadic and uneven. The Corps undertook most of this work through contracts with local companies. These contracts, while serving immediate needs, were not ideal from the Corps' position because they were expensive, and the dredging machinery was not necessarily available when the corps required it.<sup>17</sup>

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<sup>15</sup> "The Most Powerful Dipper Dredge in the World," International Marine Engineering 20 (June 1915), 254-255; "10-Yard Dipper Dredges on the Cape Cod Canal," International Marine Engineering 20 (June 1915), 255-256; Frank Renzenberger, "4-Cubic Yard Dipper Dredge Kewaunee," International Marine Engineering 19 (June 1914), 252; Arthur B. King, "Col. M.B. Adams--A 4-Yard Dipper Dredge," International Marine Engineering 18 (July 1913), 280; "Dredges," in Transactions, 274.

<sup>16</sup>"Annual Reports, War Department: Report of the Chief of Engineers U.S. Army 1917," 65 Cong., 2d sess., H Doc. 596, 4162. (Hereafter referred to as "Report of the Chief of Engineers.")

<sup>17</sup>George Rogers Taylor, The Transportation Revolution 1815-1860 (NY: Holt, Rinehart and Winston, 1951), 68; Todd Shallat, "Engineering Policy: The U.S. Army Corps of Engineers and the Historical Foundation of Power," The Public Historian 3 (Summer

After the Civil War, however, the federal government began playing a larger and more consistent role in harbor and river improvements. In 1879 Congress authorized the building of a lock and dam at Davis Island, five miles below Pittsburgh on the Ohio River. The intent of this and subsequent authorizations was to deepen the channel from three feet to six feet for the first ninety miles from Pittsburgh. In 1910 the project was expanded to include the entire nine hundred miles of river, and increased low-water depth to nine feet. These improvements were to be accomplished by dredging the channel and building a series of locks and dams. Laggard Congressional appropriations and technical difficulties delayed the canalization project, and it was not until 1929 that the Ohio River slackwater project was completed.<sup>18</sup>

In order to successfully undertake this increased responsibility, the U.S. Army Corps of Engineers contracted with private shipyards to build dredges, which the Corps then operated. The entire fleet owned by the Army Corps of Engineers consisted of sea-going hopper dredges, pipe-line hydraulic dredges, dipper and bucket dredges, and snag boats. The fleets operated by the districts along the Ohio River were dominated by dipper dredges and derrick boats, and the accompanying barges and tow boats. Along the Ohio River, the Corps of Engineers divided the river into four districts: Pittsburgh, Pennsylvania; Huntington, West Virginia; Cincinnati, Ohio; and Louisville, Kentucky. Each district maintained and improved its section of river.<sup>19</sup>

The First Cincinnati District covered 170 miles of Ohio River. At the start of the twentieth century the dredge fleet of the Cincinnati district, though in good condition, was aging. One of the dredges had been built in 1880, the other in 1883. Both vessels were made with iron hulls, and wooden superstructure.<sup>20</sup>

Two years after Congressional approval for the complete canalization of the Ohio River the Cincinnati District undertook several improvements to its fleet. A new derrick boat, towboats,

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1989), 11; "Report of the Chief of Engineers 1916" 64 Cong. 2d sess., H. Doc. 1377, 1242. See also Todd Shallat, Structures in the Stream (University of Texas Press) 1994.

<sup>18</sup>Brigadier-General Herbert Deakyne, "The Canalized Ohio River," in Greater Pittsburgh 10 (October 12, 1929), 23; Pittsburgh Coal Exchange, Do You Realize? (Pittsburgh: 1922), np.

<sup>19</sup>"Report of the Chief of Engineers 1910," 2661.

<sup>20</sup>"Report of the Chief of Engineers 1920," 66 Cong., 2d sess., H. Doc. 840, 4436-4437.

flat boats, and fuel barges were all under construction, and plans were underway for a new dipper dredge.<sup>21</sup>

The bid to build the Cincinnati was given to the M.A. Sweeny Shipyard and Foundry in 1913. The Sweeny Shipyard was located in Jeffersonville, Indiana, (across the river from Louisville, Kentucky) long a ship building center. The M.A. Sweeny Shipyard was not new to government contracts, as it had built several other boats for the U.S. Army Corps of Engineers.<sup>22</sup>

Although the dredge was scheduled to be completed in 1914, only the hull and part of the upper works were finished. Corps' estimations claimed that 38 percent of the dredge was finished, and the contract was extended. By June 1915 the dredge contract was still not fulfilled, although the remaining 2 percent was completed in time for the Cincinnati to be placed in commission before the end of the year.<sup>23</sup>

Commissioned along with the Cincinnati were ten steel dump scows, and a second dipper dredge, the Marietta, built to similar specifications as the Cincinnati. The commission of these vessels doubled the district's fleet to four dipper dredges. The Cincinnati began work September 1915, while the Marietta began work one month later.<sup>24</sup>

The Corps required river dredges for two basic types of projects: new river improvements and the clearance of the shipping channel. Under these rudimentary categorizations excavations undertaken by the Corps included dredging navigation channels, harbors, deepening the approach at locks, the removal of sandbars, as well as aiding the construction of locks and dams. The dredging

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<sup>21</sup>"Report of the Chief of Engineers 1912," 62 Cong. 3d sess., H. Doc. 936, 885, 2266.

<sup>22</sup>"Report of the Chief of Engineers 1911," 62 Cong. 2d sess., H. Doc. 124, 2740; "Report of the Chief of Engineers 1913," 63 Cong. 2d sess., H. Doc. 402, 2518; Indiana, A Guide to the Hoosier State, Compiled by the Writers' Program of the Work Projects Administration in the State of Indiana (NY: Oxford University Press, 1941), 393.

<sup>23</sup>"Report of the Chief of Engineers 1914," 63 Cong 3d sess., H. Doc. 1408, 1051; "Report of the Chief of Engineers 1915," 64 Cong. 1st sess., H. Doc. 91, 3006; "Report of the Chief of Engineers 1916," 64 Cong 2d sess., H. Doc. 1377, 2870.

<sup>24</sup>"Report of the Chief of Engineers 1914," 1051; "Chief of Engineers 1916," 2870.

of the river, its sand and gravel bars, was a "continuous and progressive" project. In fact, the Corps considered clearing the river of snags and bars more difficult than maintaining the required water depth.<sup>25</sup>

The first year the Cincinnati was operational, dredging was severely curtailed by high water levels in the river. Dredging usually occurred during the low water stages from July through November. With the river running high and fast, dredging operations were delayed and 57 work days were lost in 1915. Still, the Cincinnati, and the other three dredges were able to work in the river at numerous spots. Jobs assigned to the Cincinnati included dredging a lock approach, open channel dredging, and dredging related to new lock construction, all typical dredging jobs for the Corps.<sup>26</sup>

In 1916 the Cincinnati was loaned to the Memphis District, where it worked from July 1 to December 30, 1916. Most of the work undertaken during this assignment was excavating the Memphis harbor. While the Cincinnati was on loan, the First Cincinnati District found it necessary to hire a private dredge to do emergency work, since its fleet was short-handed.<sup>27</sup>

Over the next several years, the dredge Cincinnati, along with the rest of the fleet, continued to undertake traditional dredging jobs in the First Cincinnati District. In 1919 the Cincinnati removed 75,679 cubic yards of material, along with 3 tons of rocks, and 1.6 tons of wreckage and snags from the Ohio River. In this time, the estimated value of the vessel had risen to \$88,300.<sup>28</sup>

Continuous dredging was difficult work, and necessitated frequent repairs to the machinery. This made dredge maintenance expensive. In 1920, for example, the Cincinnati required repairs totalling \$4,066.25. This was almost double the cost of repairs made to the older dredges, and 77 percent more than the dredge Marietta.

Repairs, general maintenance and positioning of the dredge

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<sup>25</sup>"Report of the Chief of Engineers 1912," 62 Cong. 3d sess., H. Doc. 936, 884.

<sup>26</sup>"Report of the Chief of Engineers 1916," 2870-2871.

<sup>27</sup>"Report of the Chief of Engineers 1917," 65 Cong. 2d sess., H. Doc. 596, 2976-2977.

<sup>28</sup>"Report of the Chief of Engineers 1920," 66 Cong. 3d sess., H. Doc. 840, 2739, 4436-4437.

limited the amount of time a dredge boat actually spent excavating. In 1916, only 20 percent of the work hours recorded by the Cincinnati was spent engaged in dredging. Two percent of the time was spent "spudding up," 9 percent was spent undergoing repairs to the machinery, and 55 percent of the time was listed under a miscellaneous repairs section.<sup>29</sup>

Despite this general maintenance, by 1934 the dredge Cincinnati was no longer in active operation. Instead, the Cincinnati was a "reserve" dredge of "non-operating status." When, in 1934, the sister dredge, Marietta was slated for repairs, it was determined that the hull of the Marietta was in poor condition, and that the Cincinnati was in better repair. Therefore, plans were made to reactivate the Cincinnati and sell the Marietta. Before the Marietta was sold, however, machinery was transferred to the Cincinnati. Most of this consisted of machine tools, lathes, shapers, a hack saw, and a grinder, as well as a water still, generator and condensate tank and pump were also transferred. At this time the Cincinnati was given a life-expectancy of twelve more years.<sup>30</sup>

At the same time, the Corps considered modifying the crew's accommodations on the Cincinnati. According to Major Fred W. Herman, District Engineer, the quarters are "quite uncomfortable, the rooms inadequate." Furthermore, the lurching and vibrations on the dredge while digging, and the placement above the boilers and engines made living conditions uncomfortable. The corps planned to assign a quarterboat with the dredge which would "permit the employees to rest in comfort and escape from the heat of the boilers and machinery," but it is unclear whether this plan was actually adopted.<sup>31</sup>

With repairs completed, the Cincinnati was returned to active duty. In 1939 the Cincinnati worked on three primary jobs between July and October. A total of 78,540 cubic yards of material was

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<sup>29</sup>"Report of the Chief of Engineers 1917," 4164; "Report of the Chief of Engineers 1920," 4436-4437; "Abstract of Bid, October 17, 1930," Box 43, Records of the Office of the Chief of Engineers, Record Group 77, National Archives, Washington, D.C. (Hereafter referred to as RG 77, NA.)

<sup>30</sup>Major Fred W. Herman to The Chief of Engineers, October 27, 1933; Lieut. Col. C.L. Hall to The Chief of Engineers, December 31, 1934; "Additions: Floating Plant Repairs," November 24, 1934, RG 77, NA.

<sup>31</sup>Major Fred W. Herman to The Chief of Engineers, October 27, 1933, RG 77, NA.

dug by the dredge. However, with the canalization of the Ohio River completed, there was less demand on the dredging fleet and only "periodic dredging" was now required.<sup>32</sup>

With the conclusion of the construction project, the excavation needs of the U.S. Army Corps of Engineers changed, and the Corps made a shift away from its ownership of a large fleet. Instead, it increased its reliance on dredging by private companies. Although private firms had always received government contracts, in the past these had been done under emergency situations that required fast action when the Corp's own fleet was occupied. Based on Corps reports, dredging by private companies was less expensive than dredging undertaken by the Corps. In 1939, for example, contractors had removed 54 percent of the material dredged in the First Cincinnati District, but had required only 42 percent of the district's dredging budget. By 1941 the First Cincinnati District had greatly reduced its fleet. No dipper dredges remained, and only a derrick boat and pipe-line dredge remained in the fleet. The district engineer reported the following year that "all new work was done by hired labor alone." Similar shifts occurred in the Pittsburgh, Huntington and Louisville districts.<sup>33</sup>

#### Dredging for a Private Company

With this transformation in dredging strategy, the Cincinnati was put up for sale in April 1941. The vessel was initially sold to Charles Zubik, of the Zubik Towing Company, of Pittsburgh. In June 1943 Charles Zubik sold the Cincinnati to the Monongahela and Ohio Dredging Company (M & O). In the agreement M & O purchased Cincinnati with "all appurtenances . . . except one generator" for the price of \$14,500 and the title to an older dredge called the Kanawha "as she now lies in the Illinois River Moorings at Joliet, Illinois."<sup>34</sup>

The new owners of the Cincinnati, the Monongahela and Ohio Dredging Company, operated a dredging and river improvement business out of Pittsburgh. The company was incorporated in 1913 under the laws of Delaware by C.E. Frankenberry and J.K. Welcher,

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<sup>32</sup>"Report of the Chief of Engineers 1940," 77 Cong. 1st sess., H. Doc. 506, 1349, 1352.

<sup>33</sup>"Report of the Chief of Engineers 1941," 77 Cong. 2d sess., H. Doc. 506, 1301-1305; "Report of the Chief of Engineers 1942," 78 Cong. 1st sess., 1132.

<sup>34</sup>Bill of Sale Dredge Cincinnati, June 30, 1943, Records of the Monongahela and Ohio Dredging Company.

both of Pittsburgh, Pennsylvania, and T.J. Chantler of Beaver, Pennsylvania. The company was chartered to undertake the "business of contracting and dredging in any water of the United States or elsewhere." With its office in Pittsburgh most of the work undertaken by M & O was on the Ohio River system. In 1921 the incorporation charter was amended, and Phil Kusart replaced J.K. Welcher on the list of officers.<sup>35</sup>

Two of these men, Charles E. Frankenberry and Phil Kusart, had worked for C.I. McDonald at Baden, Pennsylvania, and had built the dredge Central in 1898. Later, this dredge was sold to the Monongahela and Western Dredging Company, owned by the Jutte Family. Frankenberry served as engineer to the Central under these owners. Kusart also worked for the Monongahela and Western Dredging Company.<sup>36</sup>

Docking at the Monongahela Wharf at Pittsburgh and with offices in the Oliver Building in the same city, M & O operated on the Ohio River and its tributaries, particularly the Monongahela and Allegheny River. It was not unusual, however, for dredging jobs to be done on other rivers, including the Illinois and Kanawha Rivers. In 1931 M & O owned four dipper dredges, two towboats, two steel dump scows and ten wooden scows, all of 100 yards capacity. The dredges were of 2 or 3 yard bucket size, and the largest dredge was 90' long, with a 30' beam, and 7' deep.<sup>37</sup>

Under M & O ownership, the Cincinnati was modified to dig up to 33', almost double the depth under Corps ownership. The Cincinnati was operated by seven people, four fewer than used by the Corps for the same vessel. The engineer was joined by a cranesman, fireman, deck hand, two watchmen and a cook. Crew members came from river cities in Pennsylvania, West Virginia, Ohio and Illinois. Although Ray Ritchie served as the Cincinnati engineer for most of its active service at M & O, he was an exception. Changes in crews were frequent and erratic. John Jackson, for example, worked for the company for only nine days,

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<sup>35</sup>"Act of Incorporation, Monongahela and Ohio Dredging Company, 1913;" "Certificate of Amendment of Monongahela and Ohio Dredging Company, 1921," in Records of the Monongahela and Ohio Dredging Company.

<sup>36</sup>"C.E. Frankenberry Died Early Monday Morning," The Waterways Journal LVII (May 1, 1943), 1.

<sup>37</sup>Ethel C. Leahy, Who's Who on the Ohio River and Its Tributaries, (Cincinnati: The E.C. Leahy Publishing Co., n.d.), 423, 773.

when he "left the boat and did not return."<sup>38</sup>

Working on a dredge boat was not for everyone. The job demanded long stretches on the river, away from home, and as the engineer in the U.S. Army Corps had noted early, the vessel's movement during dredging was rocking and bothersome. In 1948 M & O had one new crew member quit as the "dredge rocking made her sick."<sup>39</sup>

In October 1943, just five months after being sold to M & O, the Cincinnati was working on an assignment. This first project for the Cincinnati was to remove 85,000 cubic yards of material at Buffington Island for the U.S. Corps of Engineers in the Huntington District. It was decided at this first job to rename the Cincinnati, the Kanawha. In a news article a company representative noted that this decision had been made after "noting the good performance of the boat on the present job," and in honor "of a former successful dredgeboat."<sup>40</sup>

On numerous occasions after it was sold, the newly named Kanawha continued to work for the U.S. government on a contractual basis. Government jobs were a critical source of revenue for private dredging companies as these jobs were often large undertakings. Corporate survival, however, demanded a broader base of customers than only the federal government, and the industries of the region also provided numerous dredging jobs for M & O.

Beginning in the 1940s the Kanawha worked for some of the largest companies in the Pittsburgh region, including the American Bridge Company, Jones and Laughlin, Pittsburgh Plate Glass Company, Pittsburgh Coal Company, Carnegie-Illinois Steel Company, and at McKeesport for National Tube Works.<sup>41</sup> These companies required the dredging services of M & O to deepen and clear out landings and harbors, dig and lay pipelines, place and repair pipes in the rivers, to sink pilings in the river, clear out sunken barges, and remove industrial waste from the river. All these jobs required excavating machinery, and the dipper dredge continued to be the

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<sup>38</sup>Payroll Reports, 1942; SS-1 Schedule A Employer's Tax Return, 1942, Records of the Monongahela and Ohio Dredging Company.

<sup>39</sup>Robert Frankenberry, February 13, 1948, Time Book, Records of the Monongahela and Ohio Dredging Company.

<sup>40</sup>J. Mack Gamble, "Upper Ohio News Notes," The Waterways Journal LVII (November 6, 1943), 19-20.

<sup>41</sup>Kanawha Log Books, Records of the Monongahela and Ohio Dredging Company.

best machine for the job. Despite its age, the Kanawha continued in service from the 1940s to the 1970s.

The M & O fleet in 1959 included five dredges, one derrick boat, and four tow boats. Two of these dredges were originally owned by the Army Corps of Engineers, the Kanawha and the Pacific. In 1945 M & O had purchased the Nolin River, an A-frame style dipper dredge, from the Louisville District of the U.S. Army Corps of Engineers. M & O paid \$14,000 for this dredge, and renamed it the Pacific.<sup>42</sup>

Even though the Kanawha was still in operation, it was not an easy task to keep the vessel working. Extended repairs were made at the company's wharfs, first in Pittsburgh, and later at McKees Rocks. The Kanawha spent the first three months of 1945 at the wharf, undergoing repairs until the first job of the year started in April. At the conclusion of this job, the Kanawha spent two weeks more at the wharf for repairs before going out on a job for Jones and Laughlin Steel Corporation. Even at a job site repairs were being made to the dredge. Most Sundays, when dredging was not done, the engines, boilers, ropes and other equipment on the Kanawha was adjusted or repaired.<sup>43</sup>

Down time was not always caused by dredge repairs, but rather slow business. Repairs were sometimes made when the company did not have jobs to send the dredge on. Typically this occurred during the winter months. The company made an attempt to spread out the necessary repairs to their fleet, as both a fiscal policy and in order to have the majority of the fleet working when possible. Although it was typical to schedule boat repairs during the slower winter season, in 1952 Robert Frankenberg, one of the two sons of founder Charles who presided over the company, noted that the upcoming winter the entire fleet would be at the wharf "for the first time in my experience."<sup>44</sup>

For the M & O, as with other companies in western

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<sup>42</sup>R.E. Frankenberg to Lt. C.E. Frankenberg, Jr., November 24, 1945; Monongahela and Ohio Dredging Company 1942 United States Annual Information Return, Form #1096, Records of the Monongahela and Ohio Dredging Company.

<sup>43</sup>Kanawha Log Books, Records of the Monongahela and Ohio Dredging Company.

<sup>44</sup>Robert E. Frankenberg to M & O Dredging Company, February 1945; Robert E. Frankenberg to Mrs. Winifred E. Frankenberg, December 19, 1952, Records of the Monongahela and Ohio dredging Company.

Pennsylvania, the steel industry was an important source of work. In 1946 Robert E. Frankenberry wrote that "things here in Pittsburgh are very slow. Strikes have shut down many plants here and with the coal strike being pulled next Monday we expect steel production to drop considerably."<sup>45</sup> Similarly, in 1960 he reported that it was a difficult time for the firm as they had "very little work to do and right now are running at 50% single shift capacity."<sup>46</sup>

Like other successful businesses, however, there were good times in between these slow periods. In 1952 Robert Frankenberry wrote that the work has been "mushrooming here into more satisfactory proportions and it has kept all of us on the go continually with quite a bit of out of town time."<sup>47</sup>

The Kanawha continued to be an operational dredge for M & O through the 1950s and 1960s. However, the older the dredge got the more time it spent undergoing repairs. In 1966 the company replaced the hull. In 1973, the dredge spent the first seven months at the wharf for painting and renovations. On July 24, the dredge left Pittsburgh for a pipeline job for Consol Gas Corporation. The Kanawha was back at the wharf between August and September, when it left for another pipeline job for Texas Eastern Gas Company. Dredging was delayed on this job for an afternoon when the port spud wire broke and had to be fixed. By the end of October, the job was completed, and Kanawha was back at the wharf. The final job for the Kanawha was another pipeline job, at Huntington, West Virginia, during February and March 1978.<sup>48</sup>

Although the Monongahela and Ohio Dredging Company continues to operate, the Kanawha served only as a backup dredge until it was sold in 1993. Reportedly, the new owner removed the machinery and dredging material and has moored the boat on the Ohio River near Sewickley, Pennsylvania.<sup>49</sup>

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<sup>45</sup>R. E. Frankenberry to C. E. Hughes, March 28, 1946, Records of Monongahela and Ohio Dredging Company.

<sup>46</sup>R.E. Frankenberry to Herbert T. Anderson, August 3, 1960, Records of the Monongahela and Ohio Dredging Company.

<sup>47</sup>Robert E. Frankenberry to Lt. Edward T. Lantry, October 15, 1952, records of the Monongahela and Ohio Dredging Company.

<sup>48</sup>Kanawha Log Book, 1953-1978, Records of the Monongahela and Ohio River Company; Don P. Frankenberry Interview with author, March 16, 1994.

<sup>49</sup>Don P. Frankenberry Interview with author, March 16, 1994.

Built during a transitional stage of American ships and dredges, the Cincinnati was typical of dredges from this period. It was built to allow the U.S. Army Corps of Engineers to undertake its mandate to improve the Ohio River. The design and size of the Cincinnati made it ideal for working conditions on the shallow waters of the Ohio River system. It operated on a regular basis until 1978, almost twenty-five years longer than the life-expectancy assigned to the dredge by the Corps of Engineers. Working for a private firm, the dredge worked at a greater variety of sites than it had under government auspices. Although still doing contractual work for the Corps of Engineers, the Kanawha also worked for coal, steel, gas and electric companies, clearing out harbors and landings, replacing pilings, building new wharfs, and laying pipelines. Even though the dredge Cincinnati served in both the fleet of the U.S. Army Corps of Engineers and a private company, it was a typical, if small, river dredge. During its seventy-eight year existence the Cincinnati substantiated the versatility and importance of the dipper dredge to American commerce and became one of the last crane-style dipper dredges afloat in American waters.

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