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Exporting Coal Via the Inland Rivers System

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Summary

Low-cost transportation of coal from the mining areas to the exporting docks via the Inland Rivers System is available. The author describes technical aspects of barge loading and unloading, and concentrates on the transshipping facilities in the Gulf Coast area.

1. Historical Background

Coal is certainly no stranger to the Inland Rivers System. From the earliest recorded times, coal was floated downstream in crude wooden "flats" timed to meet every anticipated rise in the river level. From historical "rafting" of coal to today's large efficient fleets of many 1,500 ton* capacity river barges with 6,000 and 10,000 horsepower boats the process has been one of steady evolution. The canalization of the Mississippi River System with dams and locks, starting in 1929, transformed the river from a hit or miss adventurous trip to a regularly scheduled network of dependable transportation.

Today about 120 million tons of coal move by water to destination. Major power plants along the rivers system consume the lion's share of this coal.

Fig. 1 shows the steady historical and projected growth for all commodities moved on water from 800 million tons/year in 1950 to a projected 2,600 million tons in the year 2000. This represents a growth of over 300% in this half century.

A breakdown of this growth of river traffic is shown in Fig. 2. Note that while chemicals, grains, and metallic ores show a steady growth, petroleum movement will decrease steadily. Counteracting petroleum traffic decline and increasing at a spectacular rate is U.S. coal. This prediction shows that coal river traffic will triple in a thirty year span.

* The term "ton" signifies 2,000 pounds.

Fig. 1: Total U.S. waterborne commerce, historical and projected, 1947—2003. Source: National Waterways Study.

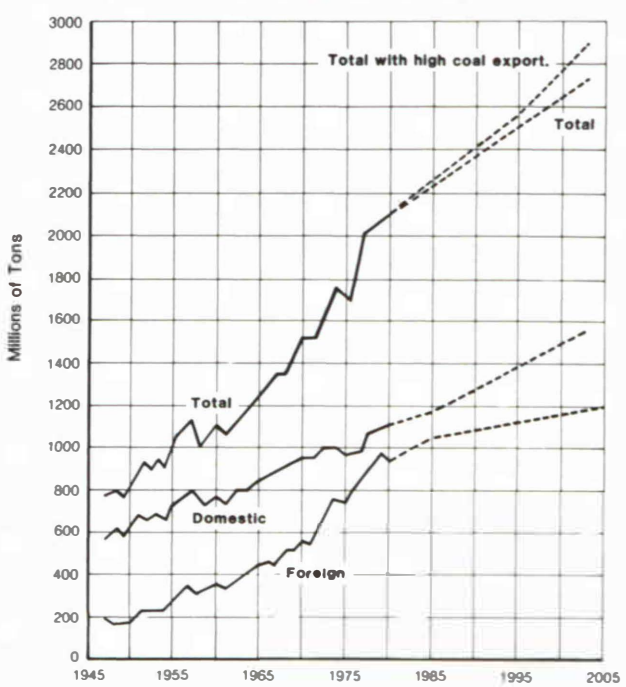
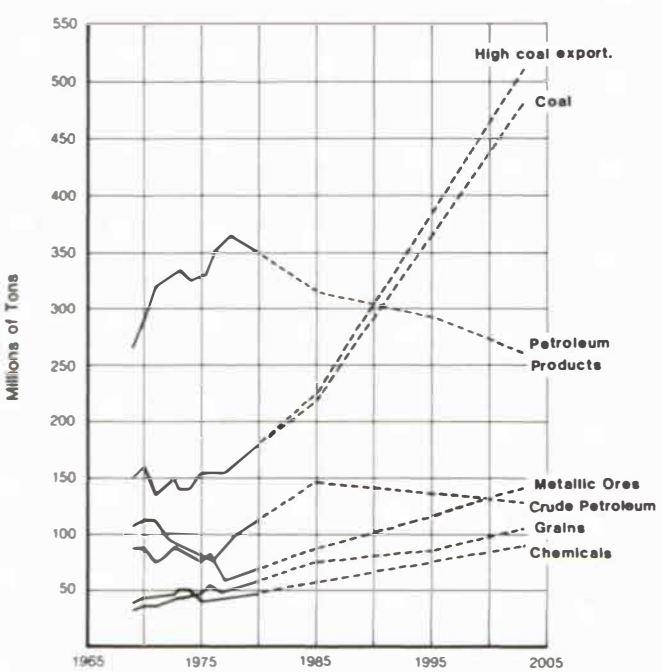
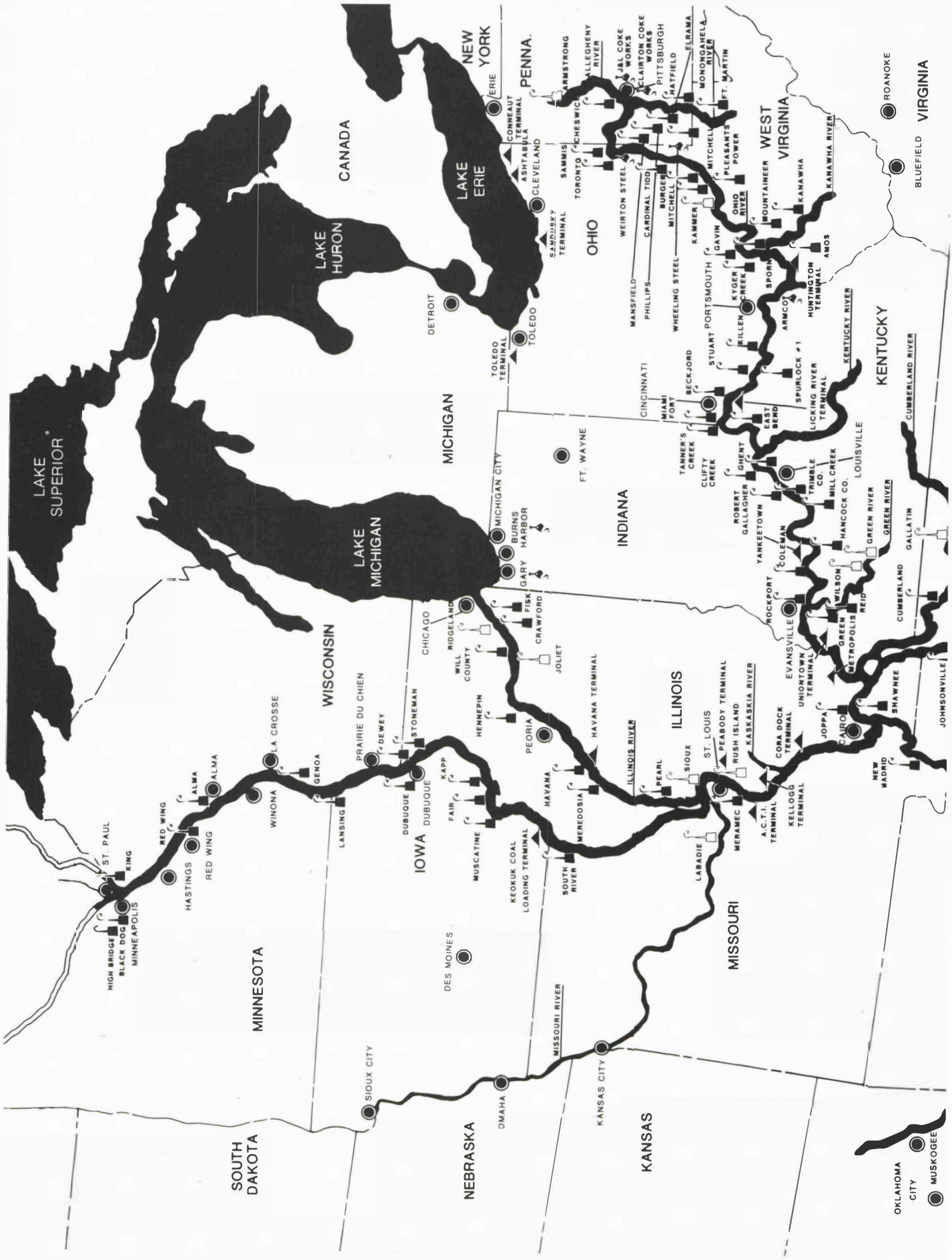


Fig. 2: Selected major commodities in U.S. domestic waterborne commerce, historical and projected, 1969—2003. Source: National Waterways Study.




LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ERIE
CANADA
MICHIGAN
NEW YORK
PENNA.
OHIO
INDIANA
ILLINOIS
WISCONSIN
MINNESOTA
IOWA
MISSOURI
KENTUCKY
WEST VIRGINIA
VIRGINIA
NEBRASKA
KANSAS
SOUTH DAKOTA
OKLAHOMA
DETROIT
CHICAGO
CINCINNATI
LOUISVILLE
DES MOINES
OMAHA
KANSAS CITY
SIOUX CITY
ST. LOUIS
ROANOKE
BLUEFIELD
MUSKOGEE
CITY
ERIE
CLEVELAND
TOLEDO
MICHIGAN CITY
BURNS HARBOR
GARY
FT. WAYNE
ROCKPORT
EVANSVILLE
PEORIA
HAVANA
LA CROSSE
WINONA
ALMA
RED WING
HASTINGS
ST. PAUL
MINNEAPOLIS
DUBUQUE
DEWEY
PRAIRIE DU CHIEN
GENOA
LANSING
STONEMAN
KAPP
FAIR
HENNEPIN
RIDGELAND
WILL COUNTY
JOLIET
FISK
CRAWFORD
HAVANA TERMINAL
MEREDOSIA
ILLINOIS RIVER
PEARL
SIOUX
PEABODY TERMINAL
RUSH ISLAND
KASKASKIA RIVER
CORA DOCK TERMINAL
KELLOGG TERMINAL
A.C.T.I. TERMINAL
MERAMEC
LABADIE
SOUTH RIVER
KEOKUK COAL LOADING TERMINAL
MUSCATINE
MISSOURI RIVER
CONNEAUT TERMINAL
ASHTABULA
SANDUSKY TERMINAL
TOLEDO TERMINAL
ARMSTRONG
SAMMIS
ALLEGHENY RIVER
J&L COKE WORKS
CLAIRTON COKE WORKS
PITTSBURGH
HATFIELD
ELRAMA
MONONGAHELA RIVER
FT. MARTIN
TORONTO
WEIRTON STEEL
CARDINAL TIDD
BURGER
MITCHELL
PLEASANTS POWER
MITCHELL
KANAWHA RIVER
KANAWHA
MOUNTAINEER
MANSFIELD
PHILLIPS
WHEELING STEEL
KAMMER
GAVIN
OHIO RIVER
PORTSMOUTH
STUART
KYGER CREEK
KILLEN
SPORN
ARMCO
AMOS
HUNTINGTON TERMINAL
BECKJORD
MIAMI FORT
TANNER'S CREEK
CLIFTY CREEK
GHENT
EAST BEND
SPURLOCK #1
LICKING RIVER TERMINAL
KENTUCKY RIVER
ROBERT GALLAGHER
YANKEETOWN
COLEMAN
TRIMBLE CO.
MILL CREEK
HANCOCK CO.
GREEN RIVER
CUMBERLAND RIVER
GALLATIN
CUMBERLAND
WILSON
REID
GREEN
METROPOLIS
UNIONTOWN TERMINAL
JOPPA
CAIRO
SHAWNEE
JOHNSONVILLE
NEW MADRID
HIGH BRIDGE
BLACK DOG
KING
RED WING
ALMA

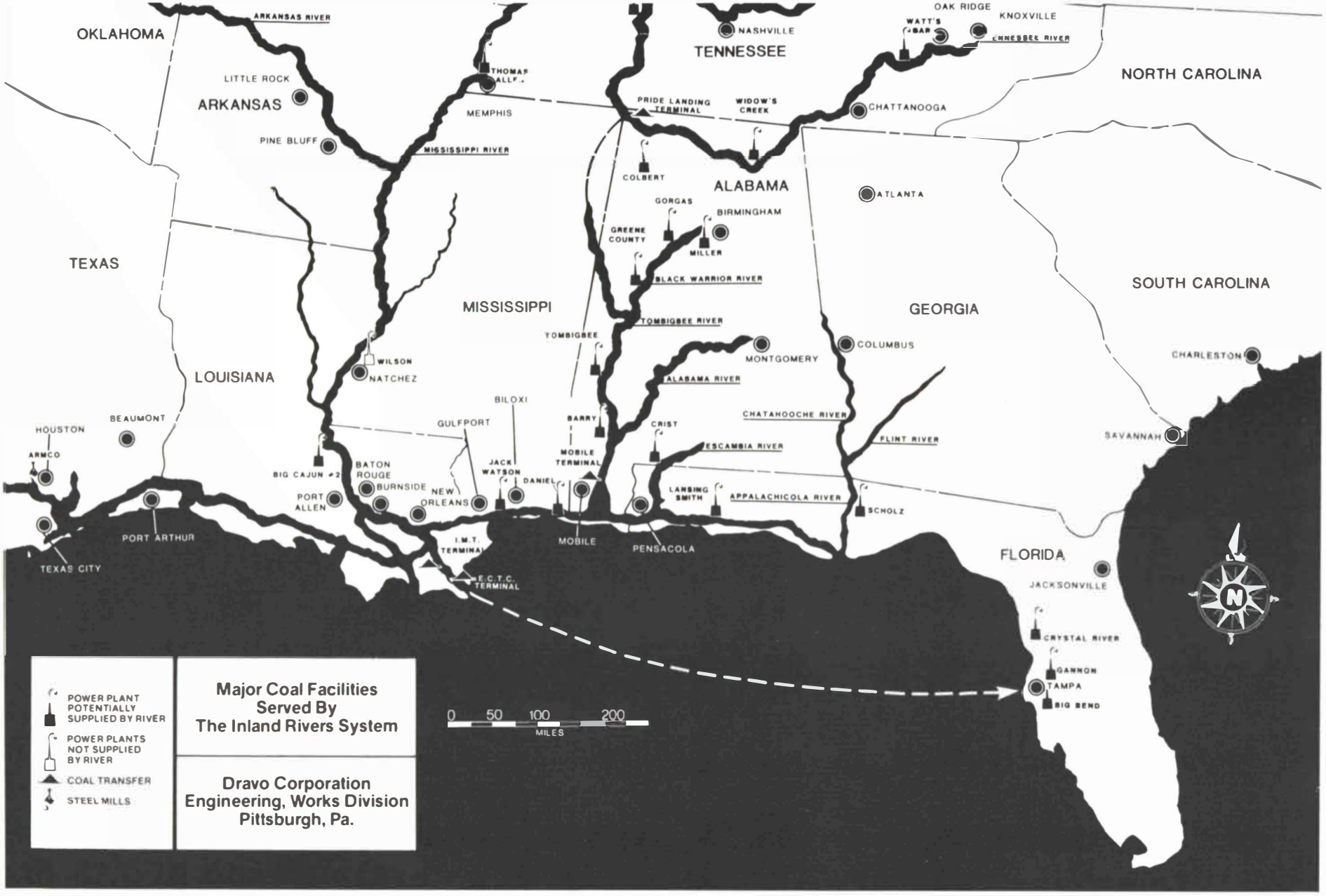


Fig. 3: Major coal facilities served by The Inland Rivers System

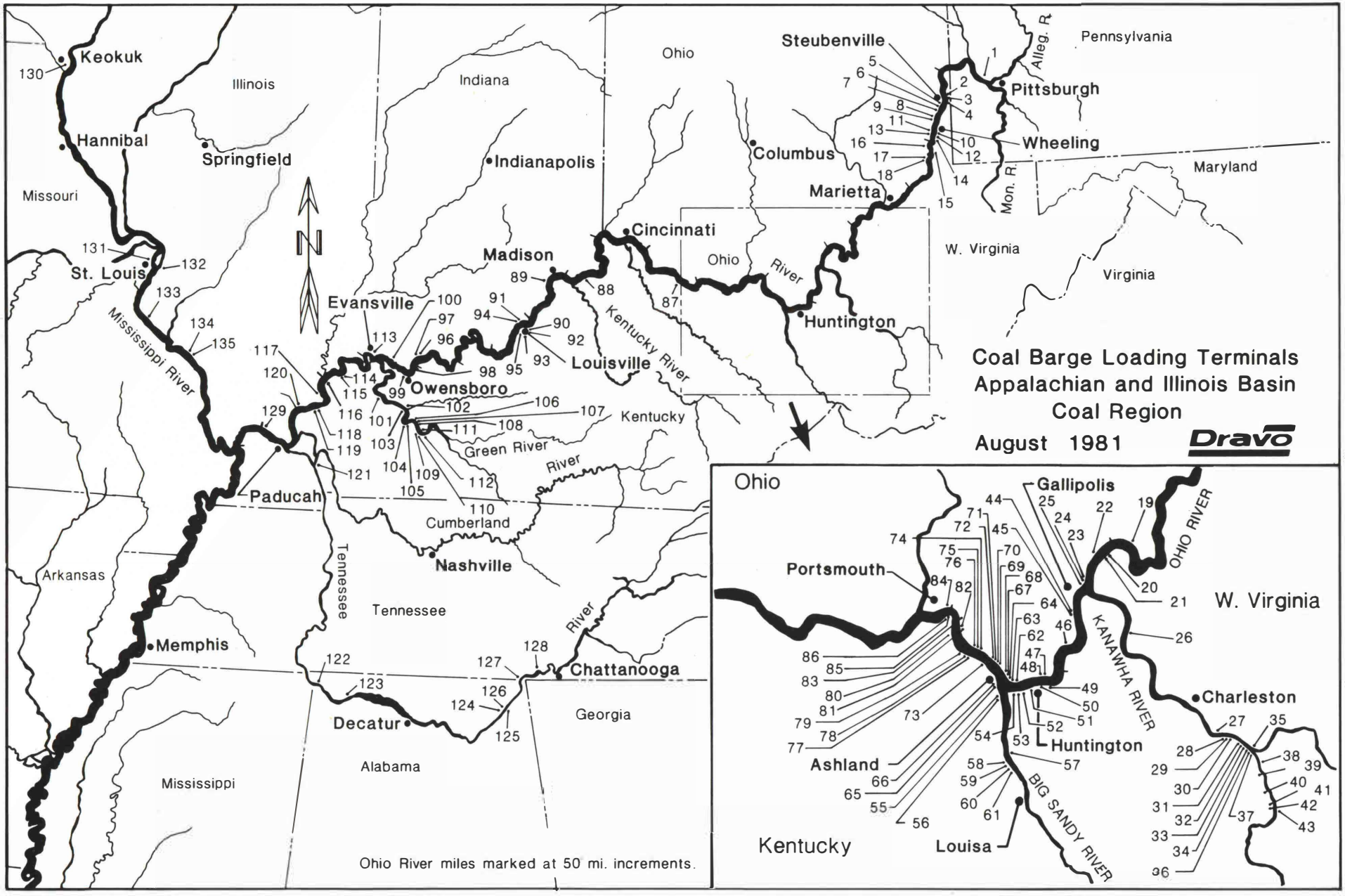


Fig. 4: Coal barge loading river terminals — Mississippi River System

OHIO RIVER

1. Conrail Terminal
2. West Virginia Energies Corporation
3. Weirton Ice & Coal Supply Company
4. Weirton Ice & Coal Supply Company (Conrail)
5. Ohio Power Company
6. Ohio Coal & Construction Company
7. Valley Camp Coal Company
8. Martins Ferry Coal & Dock Company (NYC & St. Louis RR)
9. Thomas Ayers (inactive)
10. Cravat Coal
11. R & F Coal Company
12. Consolidation Coal Company
13. Delta Concrete Company
14. Consolidation Coal Company
15. Valley Camp Coal Company
16. The North American Coal Company (Conrail)
17. Quarto Mining Company
18. Quarto Mining Company (Conrail)
19. Raven Hocking Coal Corporation
20. Raven Hocking Coal Corporation (C & O RR)
21. River Coal, Inc.
22. Jay-Mar Coal Company
23. Conrich Ohio, Inc.
24. Conrich Ohio, Inc.
25. Zinn Coal Company

26.-43. See Kanawha River

44. Clipper Mills Dock Company
45. Mack River Terminal
46. Crown City Mining Dock

*47. J. Mack Company

48. Riverside Marine Terminal, United Coal
49. Nicholas & Pont
50. Ohio River Company, Huntington Terminal (C & O)
51. Huntington Rail & River Company, Amherst (C & O)
52. Oglebay Norton (C & O RR, N & W RR)
53. ACBL Terminal (N & W RR)
54. ORCO Kenova Terminal (N & W RR)

55.-61. See Big Sandy River

*62. Tri-State Mining (N & W RR)

*63. George Arrington

64. All-American
65. 53rd Street Dock, Ashland Coal
66. Mansbach Metal Highland Coal
67. Oliver Elam
68. Coal Grove Dock

*69. Commercial Coal (Prop.)

*70. Rail River Terminal, DT & I Railroad (N & W RR)

*71. Frances Elkhorn Coal

*72. Rail River Terminal, ARA Concretes

*73. Russell Facility, Ashland Coal (C & O RR)

74. Collins Mining
75. Superior River Coal (N & W RR)

*76. Proctor G. Robinson

77. Bluegrass Mining Company, Cravat Coal

*78. American Electric Power (C & O RR)

*79. RCB Fuels

*80. Teays Valley Transportation, Inc. (C & O RR)

81. Wheelersburg Terminal, Kentucky-Ohio Transportation Company, Island Creek (N & W RR)

*82. Elder Development Corporation, United Coal

83. Belville Mining

*84. Trans Coal Corporation (C & O RR, N & W RR)

85. South Shore Terminal, Kentucky-Ohio Transportation Company Island Creek (C & O RR)

*86. George Arrington (C & O RR)

87. River Coal & Dock Company
88. Clean Coal (L & N RR)
89. Standard Supply Company (inactive)
90. River Road Terminal
91. E. T. Slider, Inc.
92. Livron L & N Railroad
93. Louisville Coal Tipple, American Commercial Barge Line
94. Charles Buddeke Coal Company (I.C. RR)
95. Louisville River Terminal (L & N RR)
96. Three States Coal Company
97. Fayette Building Corporation
98. Mid-America Terminal, Kentucky Coal (L & N RR)
99. Green Coal Company
100. Yankeetown Dock Corporation (Southern RR)

101.-112. See Green River

113. Evansville Terminal Company
114. Overland Coal Transportation, Inc.
115. Uniontown Mine, Island Creek
116. Hamilton Mine, Island Creek
117. Peabody Coal Company
118. DeKoven Coal Mining Company
119. Pyro Mining
120. Ryan Contracting Company

121.-128. See Tennessee River

129. Cook Coal Dock, (AEP) (B.N. RR)

MISSISSIPPI RIVER

130. Keokuk Loading Terminal, ORBA-Johnson Transhipment Company (ICG RR & B.N. RR)
131. Hall Street Terminal, American Commercial Terminals (BN RR)
132. Peabody Coal Company (Terminal RR)
133. Kellogg Terminal, Consolidation Coal Company (MOPAC RR)
134. Ford Dock, Arch Minerals (MOPAC RR)
135. Cora Dock, Federal Barge Lines (MOPAC RR)

KANAWHA RIVER

26. Union Carbide Corporation
27. Amherst Industries (Conrail)
28. South Appalachian Coal Company, Marmet Dock
29. South Appalachian Coal Company, Davison Dock
30. Carbon Fuel Company (C & O RR)
31. Carbon Fuel Company (C & O RR)
32. Amherst Industries
33. Cedar Coal Company
34. E. M. Frederick & Associates
35. Valley Camp Coal Company
36. Oak Development Company (C & O RR)
37. East Bank Dock Company
38. Kelleys Creek & Northeastern RR Co. (Conrail)
39. Greater Kanawha Industries, Inc. (C & O RR)
40. Central Appalachian Coal Company
41. Cedar Coal Company
42. Hawks Nest Mining Company
43. Armco, Inc.

BIG SANDY RIVER

55. Boyd County Dock Placer Amex (C & O RR)
56. Big Sandy Terminal, Island Creek
57. Dock's Creek (N & W RR)
58. Lockwood Dock, Ashland Coal
59. George Arrington

*60. George Arrington

*61. George Arrington

GREEN RIVER

101. Sebree Dock
102. Center Coal, Inc.
103. Brown Badgett
104. River Queen Coal Company, Peabody Coal Company
105. Gibraltar Coal Corporation
106. Lewis Creek Terminal
107. Western Engineering
108. Ken-Mine, Peabody Coal Company
109. Paradise Collieries, Pittsburgh Midway
110. United Dock Service
111. Peabody Coal Company
112. Jessup

TENNESSEE RIVER

121. Badgett Terminal Corporation (ICG RR)
122. Pride Landing (Southern RR)
123. Transportation Service, Inc. (L & N RR)
124. Fort Norman Dock
125. Arch Minerals Corporation
126. American Standard Coal Company
127. Tennessee Consolidated Coal Company
128. Tennessee Consolidated Coal Company

***Proposed**

Fig. 5: Major existing and proposed coal barge loading terminals

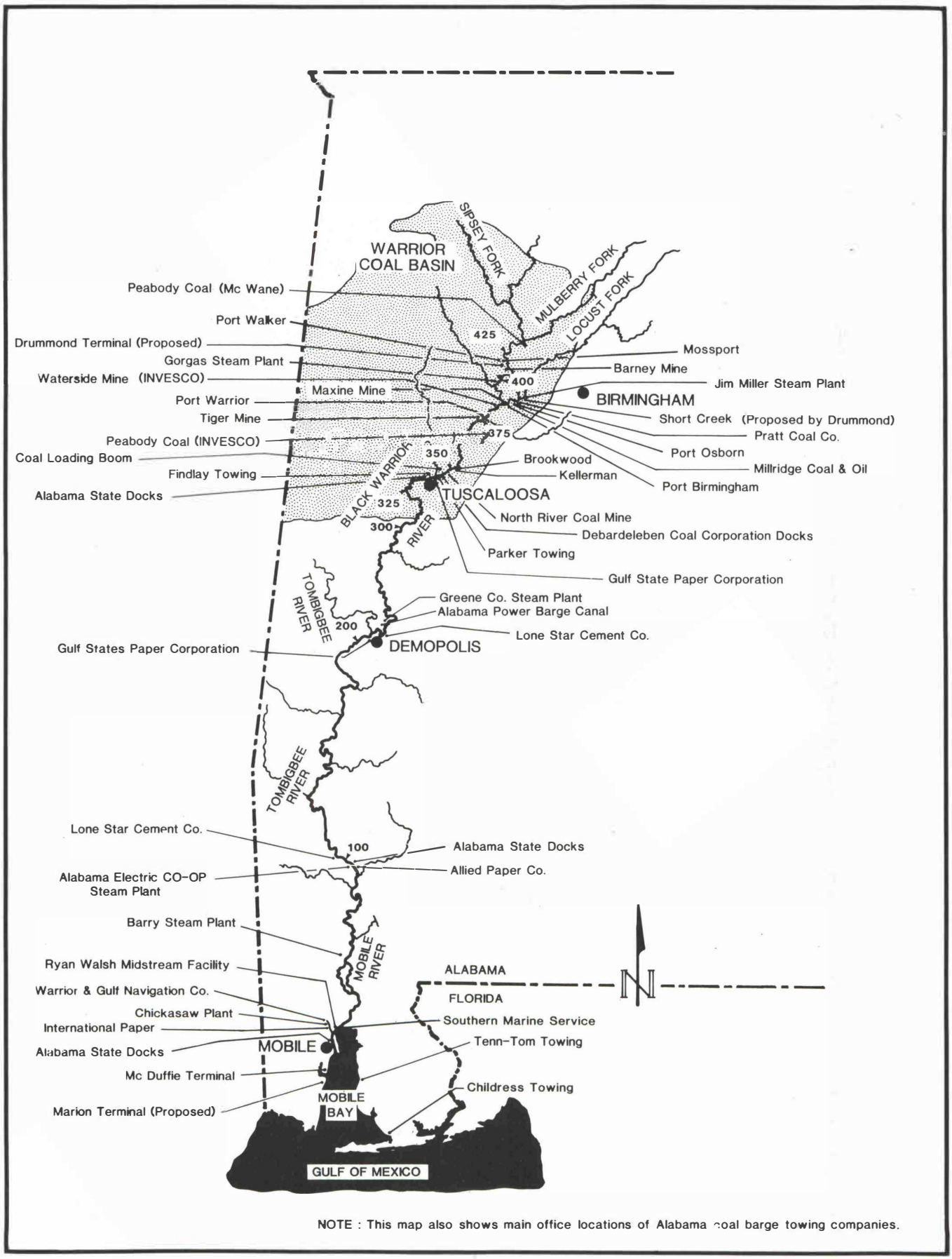


Fig. 6: Map of river system feeding Mobile coal export facilities with locations of loading terminals. A small proportion are used for loading out coal.

2. Barge Loading Terminals

To accomplish this traffic increase, one piece in the puzzle is the availability of barge loading terminals along the river system. Figs. 3, 4 and 5 depict this situation on the Mississippi River System. 135 significant terminals are located on the Ohio River area with another 6 on the Lower Illinois section of the Mississippi River.

An examination of the Black Warrior-Tombigbee River System (Fig. 6) will disclose 42 existing and proposed terminals. From this brief examination, it would appear that there is no apparent shortage of facilities to transfer coal to barges on the inland rivers.

An early barge loading terminal is located at Uniontown, Kentucky (Fig. 7). Coal received by overland belt goes either to storage or is sent directly to a 15 barge river tow to its destination.

Typical of an early major rail-to-barge transfer terminal, which transferred coal directly with no surge storage facilities, is the Ohio River terminal at Huntington. To meet an increasing traffic requirement, a modernization was completed in 1981.

A typical modern rail to barge terminal layout in shown in Fig. 8. A one million ton storage pile becomes an integral part of the layout. Unit trains can be unloaded at a rate of 3,500 t/h and barges can be loaded at 5,500 t/h.

Fig. 7: River barge loading terminal. Coal is received by 1,200 t/h overland belt conveyor and directed to either ground storage or to waiting 15 barge tow for movement to destination.

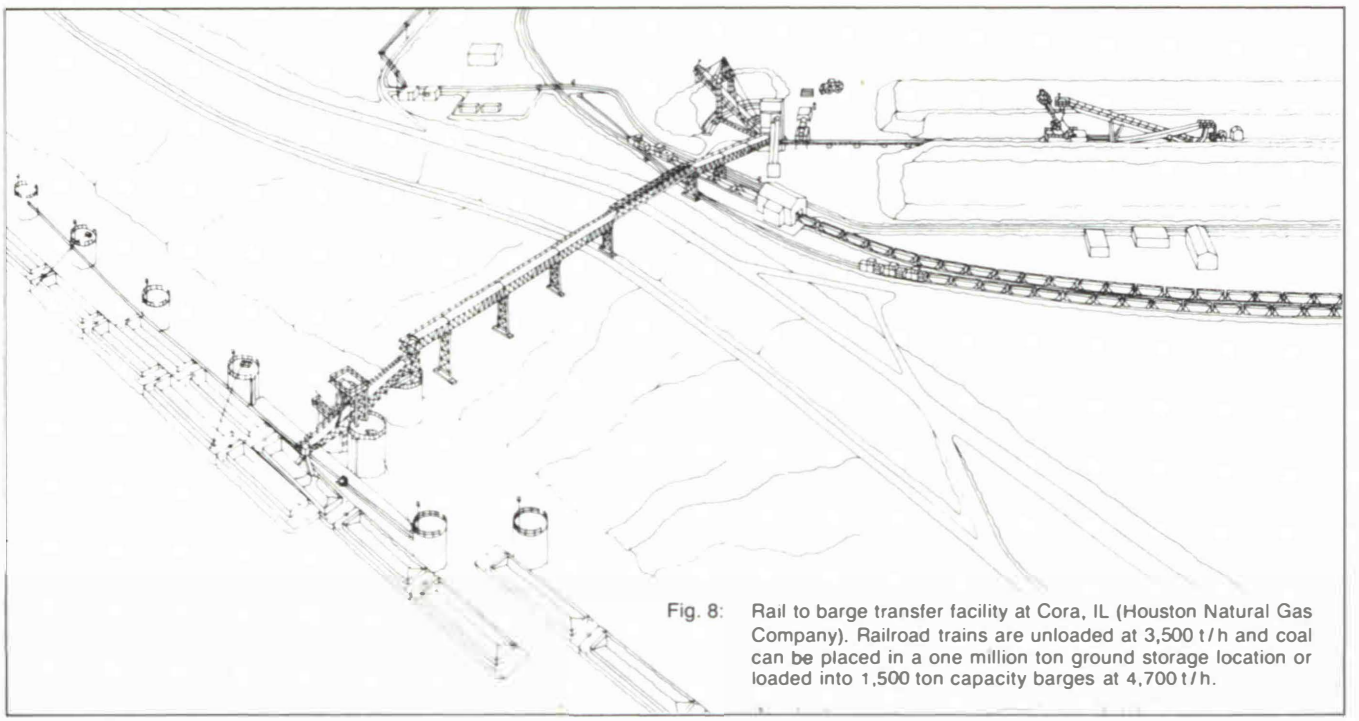


Fig. 8: Rail to barge transfer facility at Cora, IL (Houston Natural Gas Company). Railroad trains are unloaded at 3,500 t/h and coal can be placed in a one million ton ground storage location or loaded into 1,500 ton capacity barges at 4,700 t/h.

3. River Towing Practice — Coal Barges

The 195 ft x 35 ft x 12 ft open hopper barge, loaded to about 1,500 tons at 8 ft—6 inch draft, is standard on the Ohio River which flows through the major Eastern coal fields (Fig. 9). The normal practice is to push 15 barges, 3 wide and 5 long, for a single lockage in the new 1200 ft lockage system (Fig. 10). The arrangement has been called a "unit tow" system, with a barge loading system set up as shown in Fig. 11. The 5,600-HP towboat stays with the same barges as they are quickly loaded in continuous sequence.

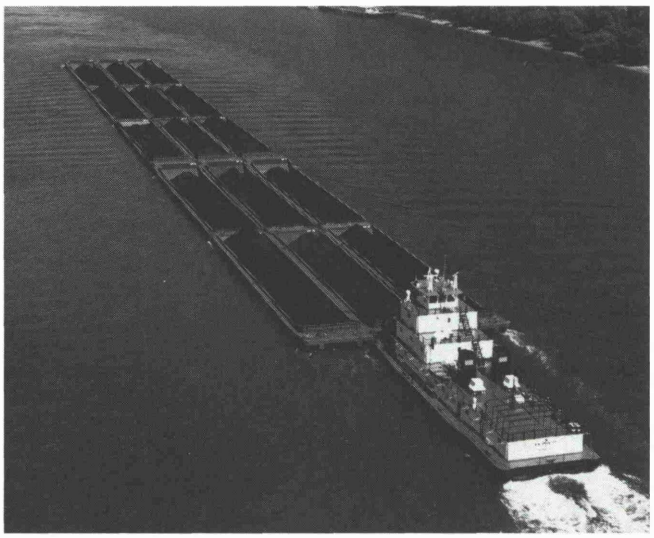


Fig. 9: A typical Ohio River tow of 15 barges transporting 22,500 tons of coal to transfer terminals

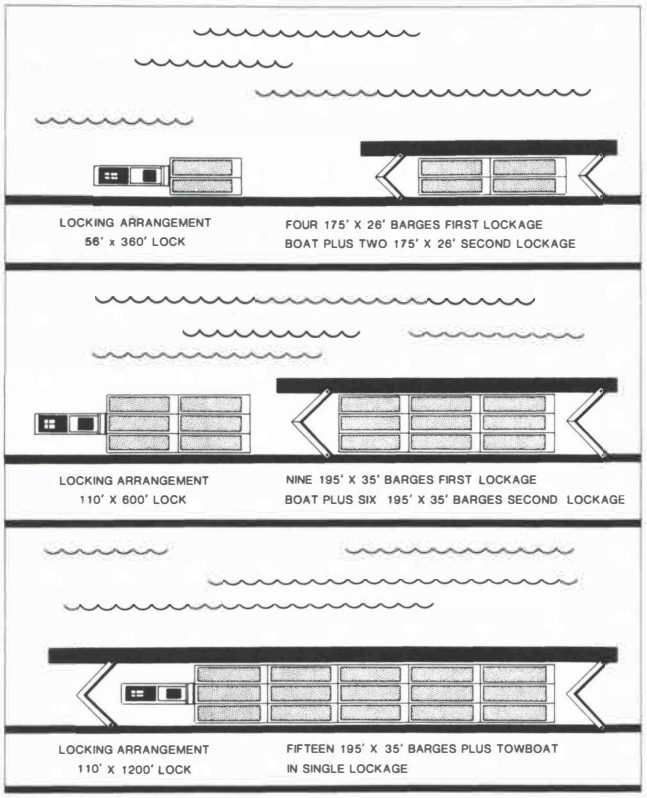
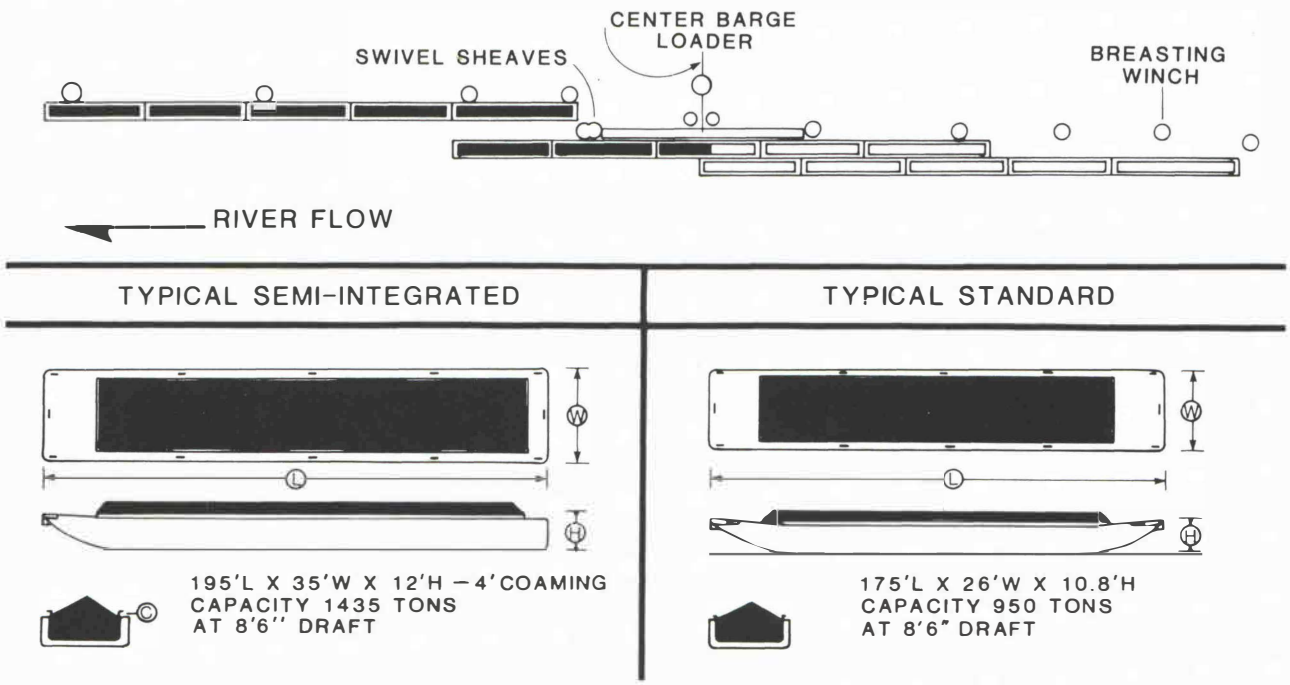


Fig. 10: Typical locking arrangement for coal towing on the Mississippi River System

On the tributary rivers with smaller locks the tow size is determined by the available lock sizes.

On the Lower Mississippi River where there are no locks, there is no limitation on the size of the tow except for safe handling by a given horsepower towboat. Here a fleet of 25 to 30 coal barges heading downstream to New Orleans is common practice.

Fig. 11: Typical "string loading" system for 15-barge river tow and dimensions of 195 ft and 175 ft barges commonly used in river operations



4. Coal Barge Unloading Equipment

4.1 Clamshell Bucket Type

Until the early 1960s, the most common unloading machinery was the stationary, clamshell bucket, straight line unloader. (Fig. 12). Peak unloading capacities varied from 800 t/h to 1,500 t/h. The combined use of clamshell bucket and small rubber-tired front-end loader (lowered into the barge) made an efficient combination for cleaning up the barge. The main drawback to the clamshell unloader was that the clamshell buckets caused damage to the barge interior plating in addition to the fact that the unloading rates had a very definite maximum limit.

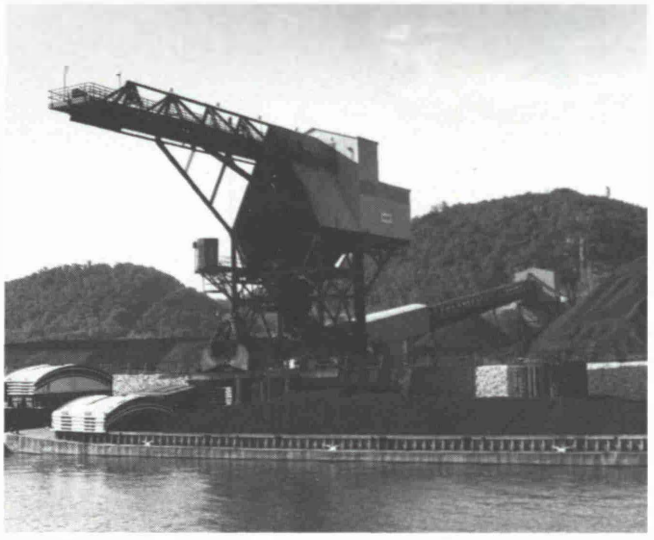


Fig. 12: This Clamshell Bucket Unloader was installed at a Mississippi River powerplant to unload river barges at a rate of 1,250 t/h. The barge covers stacked at barge end will be used on the return haul to protect the grain cargo moved downstream.

4.2 Continuous Barge Unloaders

Beginning in the early 1960s a high-capacity, improved coal barge unloading system started to emerge as a modernization of an ancient system. Since the early 1920s several steel mills had unloaded coal barges with an extremely long, fixed-width continuous bucket ladder running almost vertically on a sloping track which allowed for water height change. These fixed-width buckets required working with "captive" barges designed with a special narrow bottom width, allowing complete cleaning of the barges.

Since its inception, there had been no design progress in this style of unloader until the early 1960s. This design was then modified drastically to a short bucket ladder raised and lowered on a vertically moving support structure which discharged to a horizontal conveyor belt to take the coal ashore, similar to Fig. 13.

This improved high-capacity design went through modifications by various builders and gradually evolved into the configurations shown in Fig. 14, namely:

1. A single-head, hinged bucket ladder which on second pass oscillates across the barge width for cleanup. (Normally used for low-water rise as illustrated in Fig. 15).
2. A twin ladder unloader positioned for three-pass unloading and cleanup. Fig. 16 illustrates such a machine used at a location which operates through a river elevation change of 30 ft.

This new-style continuous barge unloader with instantaneous rates from 3,000 to 5,000 t/h of coal soon became the standard for most new large-capacity power-plants.

Fig. 13: This transfer terminal, operating since 1963, unloads coal with the Positioned-Twin Ladder Unloader at 3,000 t/h. Ground storage is accomplished with a 3,000 t/h Bucket Wheel Stacker/Reclaimer. Backhauled phosphate rock can be transferred with the 1,200 t/h Clamshell Bucket Unloader from the Gulf barge-to-river barge.

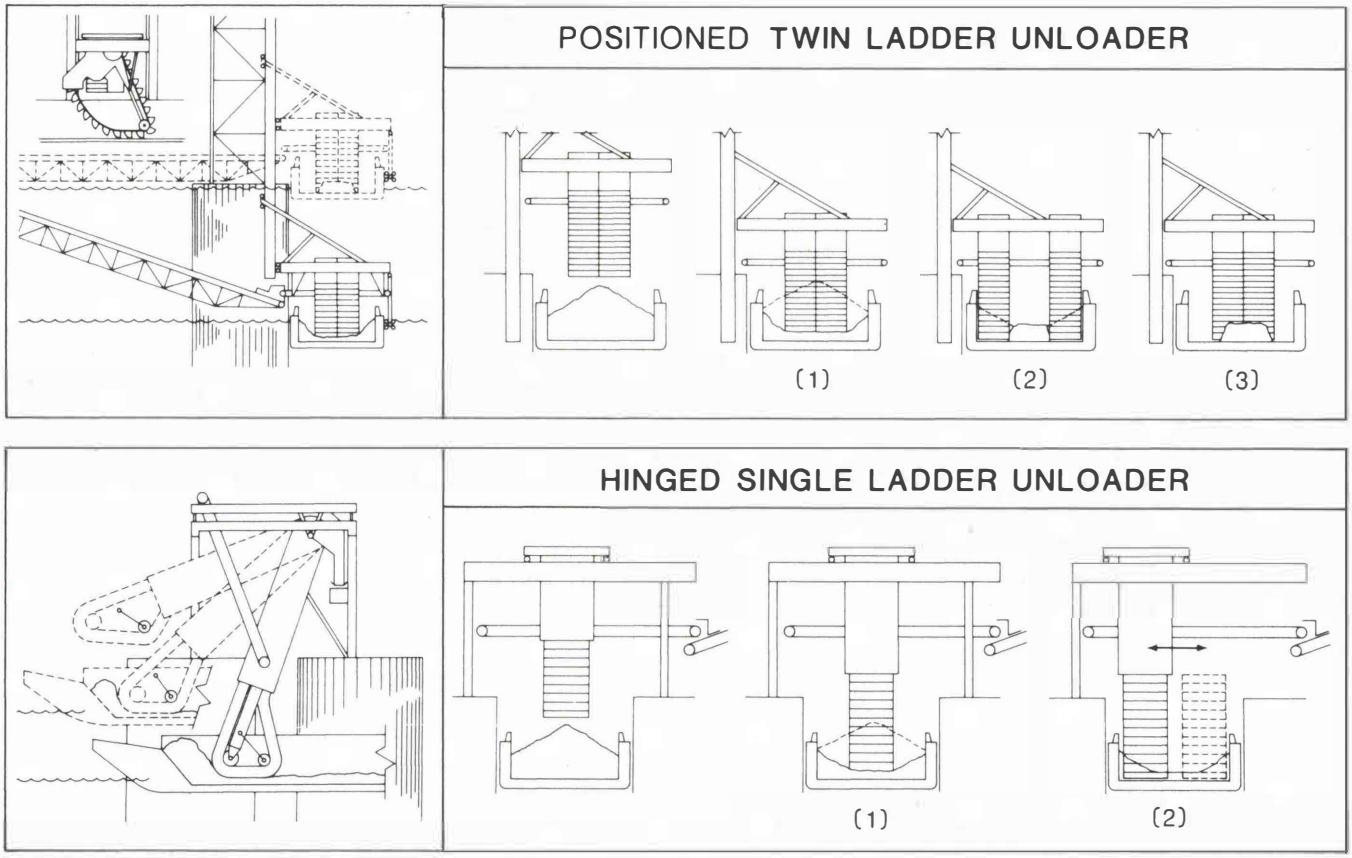
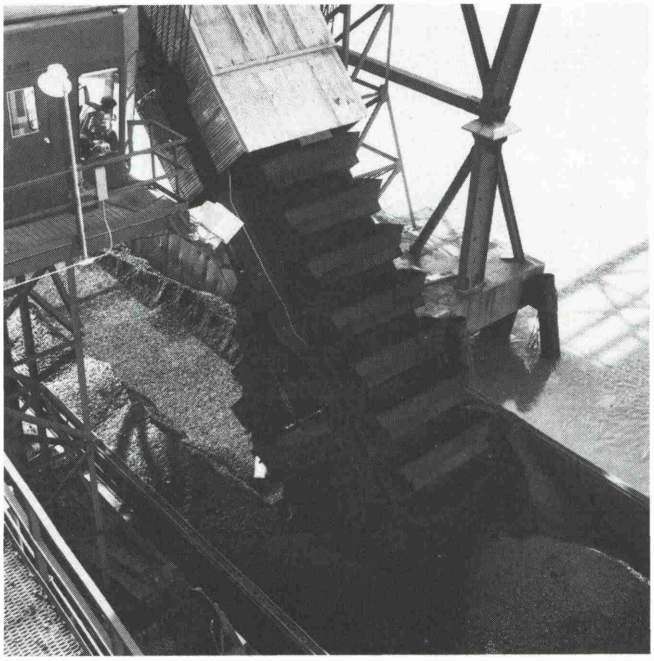


Fig. 14: The two basic configurations for open river barge continuous unloaders. The Hinged-Single Ladder Unloader is basically used for small water elevation changes. The Positioned-Twin Ladder Unloader can be used for a higher range of water elevation changes.

The capital investment cost compared so closely with the clamshell bucket unloader that, soon, only the smallest powerplants installed the clamshell unloader. The other two important factors to be noted are that the continuous barge unloader requires a less-skilled operator with less operator fatigue. Secondly, the interior damage to the barge is considerably less than that of the clamshell bucket.

Fig. 15: Coal is unloaded in two passes at 5,000 t/h with this Hinged-Single Ladder continuous barge unloader



5. Growth of the Export Coal Market — Port Locations

Looking forward, the major new factor in U.S. coal's future is the increased export coal situation. This new development appeared without significant warning in 1980. Historically, export coal has moved through the Eastern Coastal ports lying between Philadelphia and Hampton Roads.

Other than the U.S. East Coast, the alternate coal export locations available include:

1. The Great Lakes/St. Lawrence Seaway System
2. West Coast Area
3. Gulf Coast Area

In this article only the latter, the Gulf Coast Area, will be discussed which can be broken down into two general areas:

1. Lower Mississippi River area ranging from the lower passes upstream past New Orleans as far as Baton Rouge (230 miles).
2. The Mobile Bay Area served by the Black Warrior — Tombigbee River System.

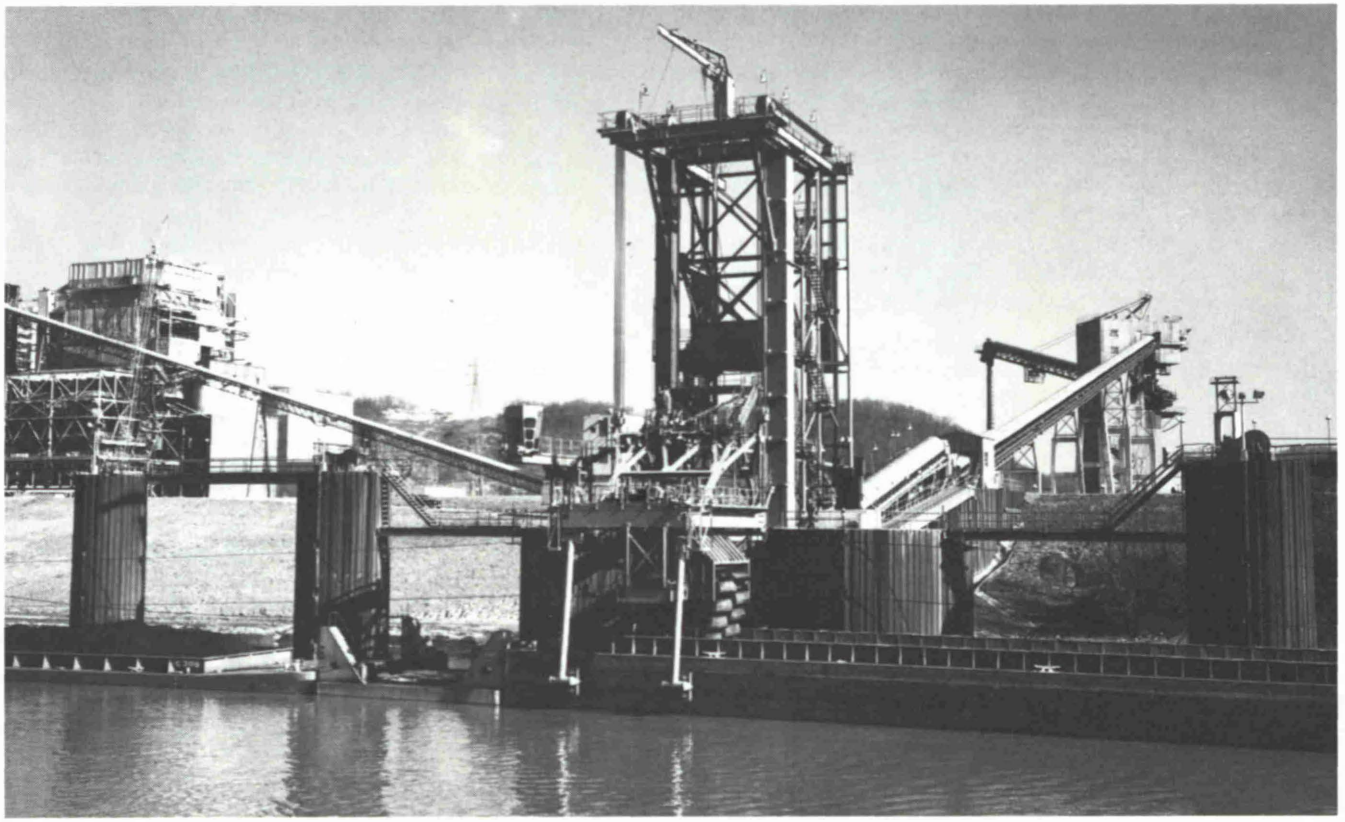
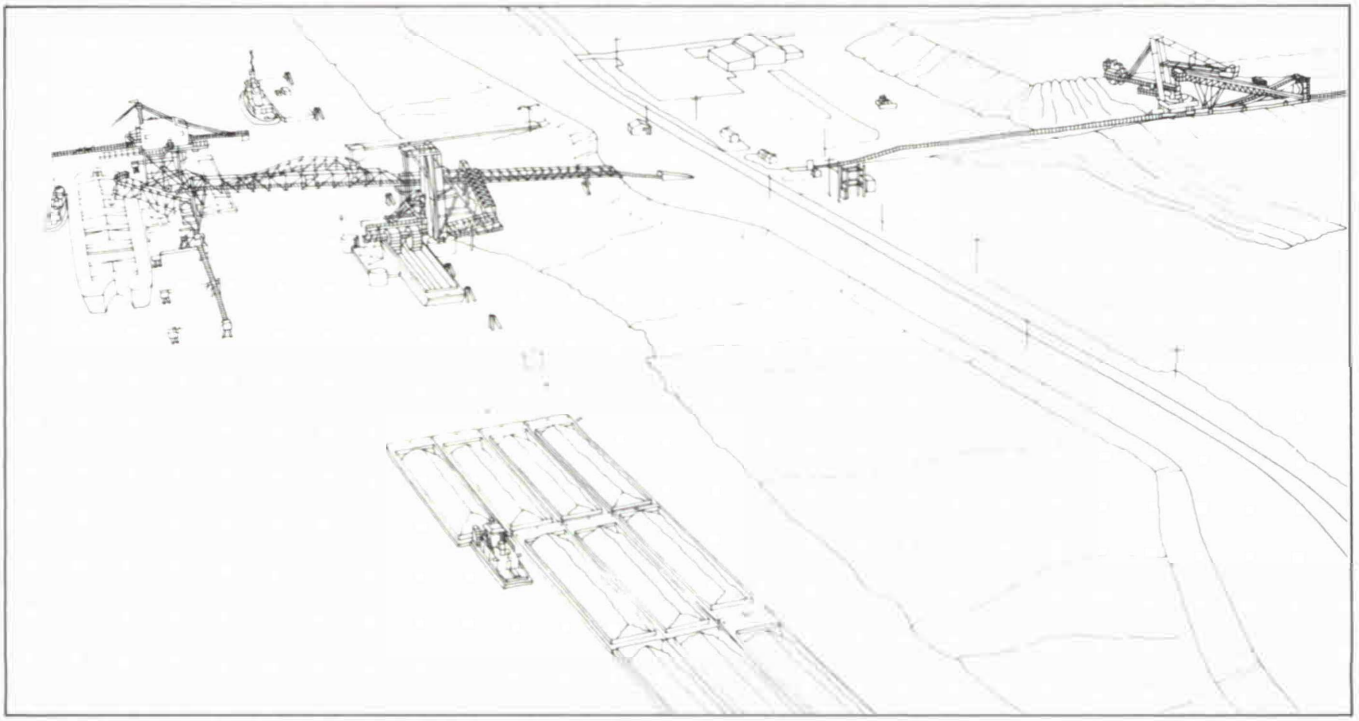


Fig. 16: This Twin Ladder 3,600 t/h continuous barge unloader can operate with a river elevation variation of 30 ft. Fast barge changing is accomplished with a patented "Shuttle Barge" haulage system.

5.1 Lower Mississippi River — Coal Transfer

This extensive natural harbor area normally handles a high percentage of the U.S. shipping tonnage and has evolved over 200 years into a busy, workable port complex for many commodities. Coal is a relative latecomer here, starting after World War II with the construction of the Myrtle Grove, Louisiana terminal. This facility allowed transferring coal shipped down the Mississippi River to deep water vessels, with subsequent moving of the coal to Florida power plants in competition with existing direct rail traffic.

Fig. 17: This existing Electro-Coal Lower Mississippi River Transfer Terminal at Davant, LA unloads barges at 3,000 t/h and works with a fixed shiploader. Phase II expansion will permit barge unloading at double this rate and a travelling ship loader will be added.



This Gulf Coast alternate coal transportation remained small and marginal until the mid-1960s when the Electro-Coal Transfer Terminal started operation (Fig. 17). An integrated system of special 30,000 DWT Gulf barges with dedicated pushing tugs worked smoothly with this 3,000 t/h barge unloading terminal. Ground storage, deep sea barge loading, and new unloading facilities on the west coast of Florida completed the picture. To completely integrate the operation, phosphate rock was moved through the same fleet and terminal as a paying backhaul from Florida to the Lower Mississippi area.

In 1978, a new terminal for the same purpose was unveiled emerging from the ruins of the previously mentioned Myrtle Grove location. Here the International Marine Terminals group conceived a phased project (Fig. 18) designed to grow with coal traffic. These two coal transfer terminals served quite adequately to supply the Florida power plant coal market.

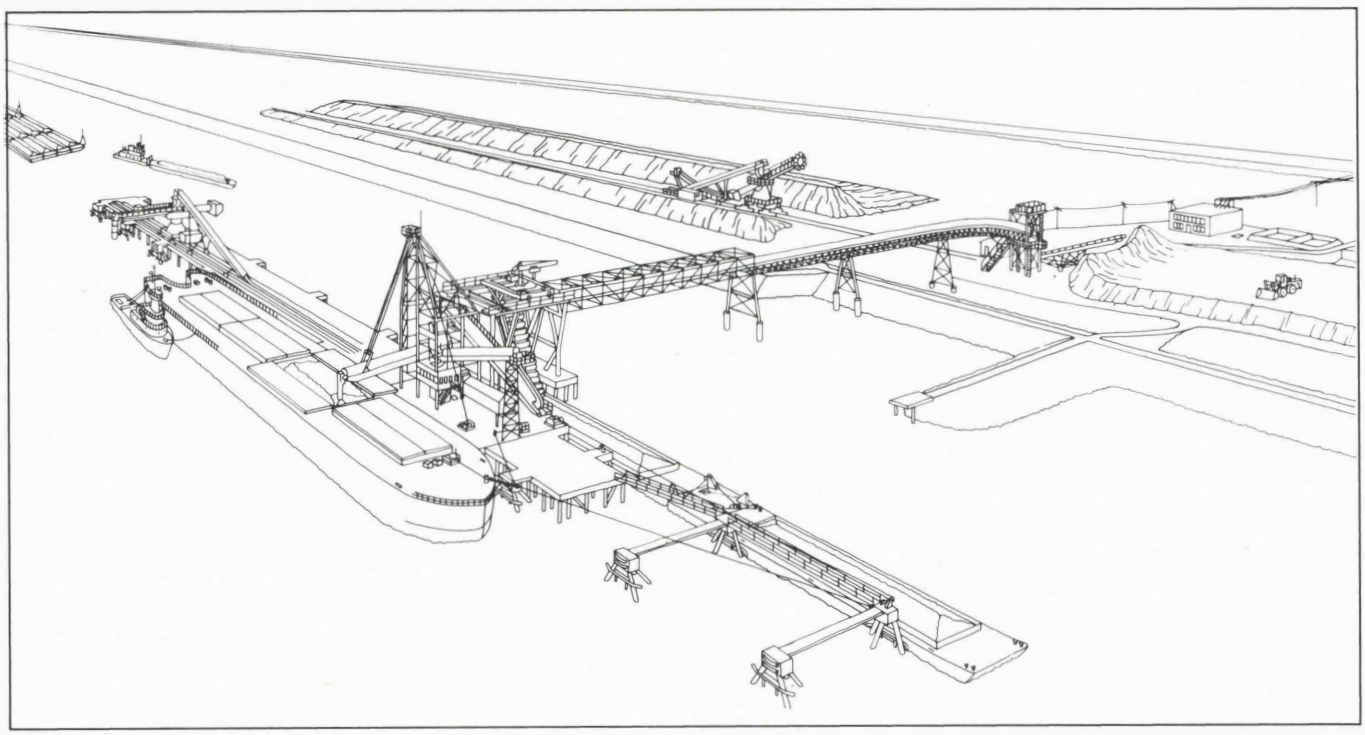


Fig. 18: Existing Lower Mississippi transfer terminal at Myrtle Grove, LA. Phase I included a barge unloading capacity of 5,000 t/h. Phase II will provide major ground storage and a travelling ship loader.

When in 1980 the sudden demand for export coal appeared to come from nowhere, the Lower Missisippi River terminal operators reacted quickly to fill the void left by the over committed East Coast ports. The two aforementioned facilities adapted to loading coal into ships for export and began expansion plans.

5.2 'Mid-Stream' Coal Transfer System

With the sudden availability of major coal tonnage for export, the New Orleans area 'mid-stream' operators moved quickly to alleviate the shortage of facilities. They were soon very busy transferring coal from 1,500 ton river barges to 'Panamax' sizes ships, up to 40 ft draft, with two to four floating derricks per ship as shown in Fig. 19. This specialized equipment proved a quick solution to a pressing problem. A standard floating transfer derrick system handles a high capacity clamshell bucket. To keep up with this rapidly expanding market, 10 or more new floating derrick boats were quickly ordered in 1980—81. The most popular size would dig 18 net tons of coal at a nominal rate of 1,000 t/h. Many existing floating transfer units normally used in grain trade were pressed into service. One new type of equipment used in coal transfer is the L.S.I. developmental unit shown in Fig. 20. Patterned after a typical straight-line unloader, the normally expected severe listing problem is counteracted with a travelling counterweight which moves directly opposite to the clamshell bucket and keeps the hull relatively stable. The original prototype machine proved a learning experience which allowed the design to be improved. The current unit in operation carries a clamsell bucket working on a 1.5 minute cycle.

It is estimated that the 'mid-stream' operators moved 750,000 tons of coal in 1980 and 8 million tons in 1981. A listing of these operators at the time of writing is given below:

Mile Pt. AHP	Operator
72	T. Smith Stevedores
115	Ryan Walsh Stevedoring Company
124	Midstream Transfer Company
151	Atlantic & Gulf Stevedores
167	Cargoes Unlimited
171/180	Cooper Stevedoring Company
229	Ryan Walsh Stevedoring Company

5.3 Shore Based Coal Transfer Terminals

To solve the basic problem of the 'mid-stream' operator, that of demurrage on river barges, other companies are

Fig. 19: Mid-stream coal transfer system (Courtesy Ryan-Walsh Stevedoring Co.)

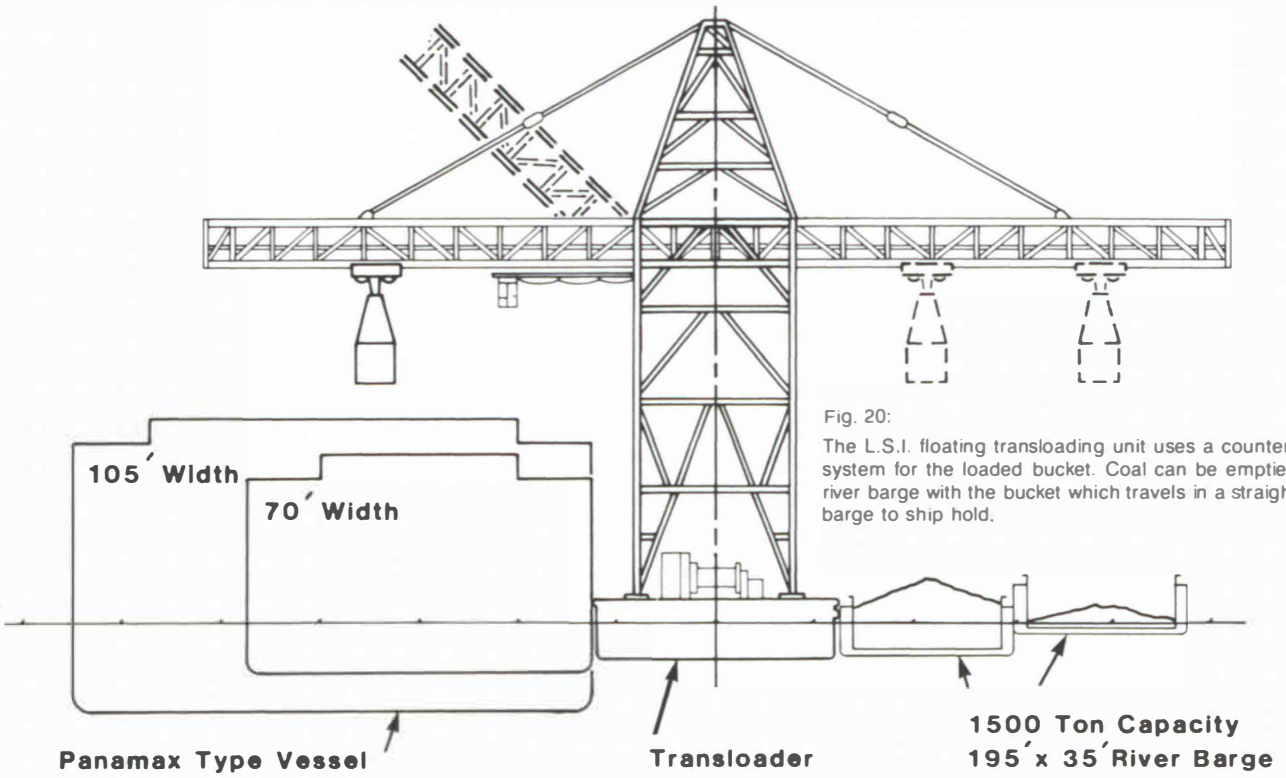


Fig. 20:
The L.S.I. floating transloading unit uses a counter-balancing system for the loaded bucket. Coal can be emptied from the river barge with the bucket which travels in a straight line from barge to ship hold.

prepared to expand or build new land transfer terminals to meet a long-range demand for export coal. Although a few plan on floating derrick transfer equipment, most envision the use of the proven continuous barge unloader shown in Fig. 21.

As shown on Fig. 22, the most prevalent location for proposed coal transfer operations is near Mile 50 A.H.P. Here four locations are proposed. The other four proposed terminals lie between Mile 148 and Mile 214 A.H.P. Most terminal layouts include continuous barge unloaders, ground storage using one or more bucket wheel stacker/reclaimers and movable shiploaders. Table 1 offers typical transportation rates and transfer costs for these terminals.

5.4 Export Coal By Rail — Lower Mississippi

To meet the competition of the low priced river movement of coal southward by Mississippi River, the Illinois Central Gulf railroad serving the area offers attractive promotional rail rates. Table 2 gives an indication of rail tariffs to the Lower Mississippi area. In addition, the Missouri Pacific serves the westerly bank as far south as New Orleans.

At present, the only significant rail coal traffic is to the New Orleans Public Bulk Terminal now operated by Ryan Walsh Stevedoring Company. It is planned to export about 500,000 tons in 1981 with a goal of 1 million tons in 1982. This particular terminal, located on the Gulf Outlet Waterway, is the only such terminal not directly on the Mississippi River. With a 36 ft draft versus 40 ft on the Mississippi River, it also offers a 'topping off' service at Mile 40 on the Mississippi. 18 hours is sufficient to move between initial terminal loading point for 50,000 DWT ships to the 'topping off' point where the cargo can be increased to 60,000 DWT. Ground storage at this terminal will be increased to 750,000 tons by the end of 1982.

5.5 Coal Export — Mobile, Alabama Area

When considering the Gulf Coast for coal export the other most significant location to be considered is the Port of Mobile, Alabama. As shown in Fig. 6 we again have a deep sea port area and plentiful coal measures connected by a navigable river system — The Black Warrior-Tombigbee System.

Table 1: Typical transportation rates and transfer costs

A. Service Charges — Approximate

	Probable Range	Approx. Average
Rail Haul-Mine to River Terminal (if required)	$ 4 to $ 5/N.T.	$ 4.50/N.T.
Transfer Charge Rail to Barge	$ 1 to $ 2	$ 1.50
Transfer Charge Barge to export Ship	$ 2.60 to $ 3.30	$ 3.00
Total Charges Except for Barge Movement	$ 8.00 to $ 10.00/N.T.	$ 9.00/N.T.

B. Total Transportation Cost — Approximate

	Approx. Tariff*		Handling & Other (A)		Total Aboard Ship
Lower Illinois to New Orleans Terminals	$ 7.50	+	$ 9.00	=	$ 16.50
St. Louis, MO or Owensboro, KY to New Orleans	$ 8.25	+	$ 9.00	=	$ 17.25
Louisville, KY to New Orleans	$ 9.00	+	$ 9.00	=	$ 18.00
Cincinnati, OH to New Orleans	$ 9.50	+	$ 9.00	=	$ 18.50
Huntington, Kenova, WV Ashland, KY	$ 10.00	+	$ 9.00	=	$ 19.00
Bellaire, OH	$ 12.00	+	$ 9.00	=	$ 21.00
Pittsburgh	$ 15.00	+	$ 9.00	=	$ 24.00

*) Volume rates. Unit tow rates may be lower. All rates per net ton.

Table 2: Cost data: transportation of coal — Southern Illinois to Gulf Coast Area (4)

	Est. Coal Price F.O.B./Mine	Rail Rate	Rail to Vessel	Barge Rate	Barge to Ship	Range of Cost-Aboard Ship	Mid-Range Aboard Ship
To New Orleans	$ 27—32	$ 4—5 (5)	$ 1.50	$ 7.25 to $ 7.75	$ 2.60 (1) to $ 3.30 (2)	$ 42.35 to $ 49.55	$ 45.95
To New Orleans via All-Rail	$ 27—32	$ 11.25 (3) to $ 16.50	$ 2.50 (1) to $ 3.00 (2)	— —	— —	$ 40.75 to $ 51.50	$ 46.13
To Mobile via All-Rail	$ 27—32	$ 12.25 to $ 16.50	$ 1.75 (1) to $ 2.25 (2)	— —	— —	$ 41.00 to $ 50.75	$ 45.88

(1) Estimated cost: Direct without Storage
(2) Estimated cost: To storage and reclaim
(3) Range of rates in Tariff ICC-ICG4163; ICC-ICG4164
(4) Based on data supplied by Illinois Central Gulf Railroad
(5) If mine is not located on river bank

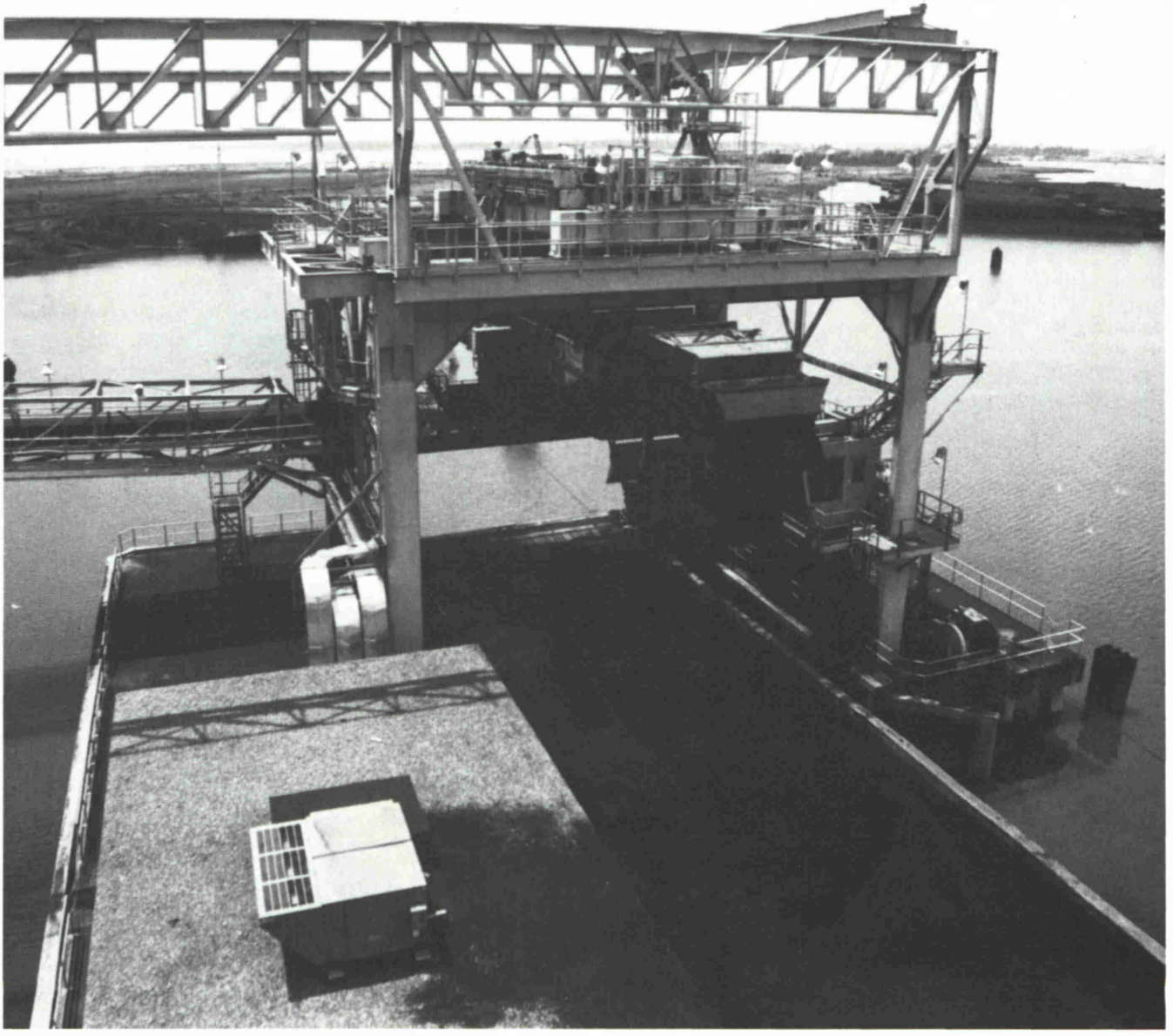
The predominant exporting facility in this area is the McDuffie Island Terminal operated by the Alabama State Docks Group. When first commissioned in 1975, the through-put capacity was about 5.3 million tons/year. Coal was received by river barge and unloaded by conventional continuous barge unloader to ground storage and loaded into ships.

With accurate foresight for future markets, the first expansion completed in 1981 will raise the throughput capacity to 7 to 9 million tons/year. A second continuous barge loader was installed and ground storage will be increased from 450,000 tons to 1.2 million tons.

Anticipating steady growth in export coal in the Gulf Coast, the State Docks group has planned a second expansion which would raise capacity to 20 million tons/year by 1983.

Another step toward increased throughput is the authorization to transfer coal other than that mined in the State of Alabama. In addition to receipt of coal by river, rotary car dumpers unload rail delivered coal. In addition to this major terminal, smaller tonnages of coal are exported by smaller operators including 'mid-stream' operations with more terminals in the planning stage. The eventual opening of the Tennessee River-Tombigbee Canal will connect this river system with the Mississippi River system and could provide additional coal tonnage for the Mobile area.

Fig. 21: New continuous barge unloader. Phase II, 1981 at McDuffie Island Terminal, Alabama State Docks, Mobile, AL



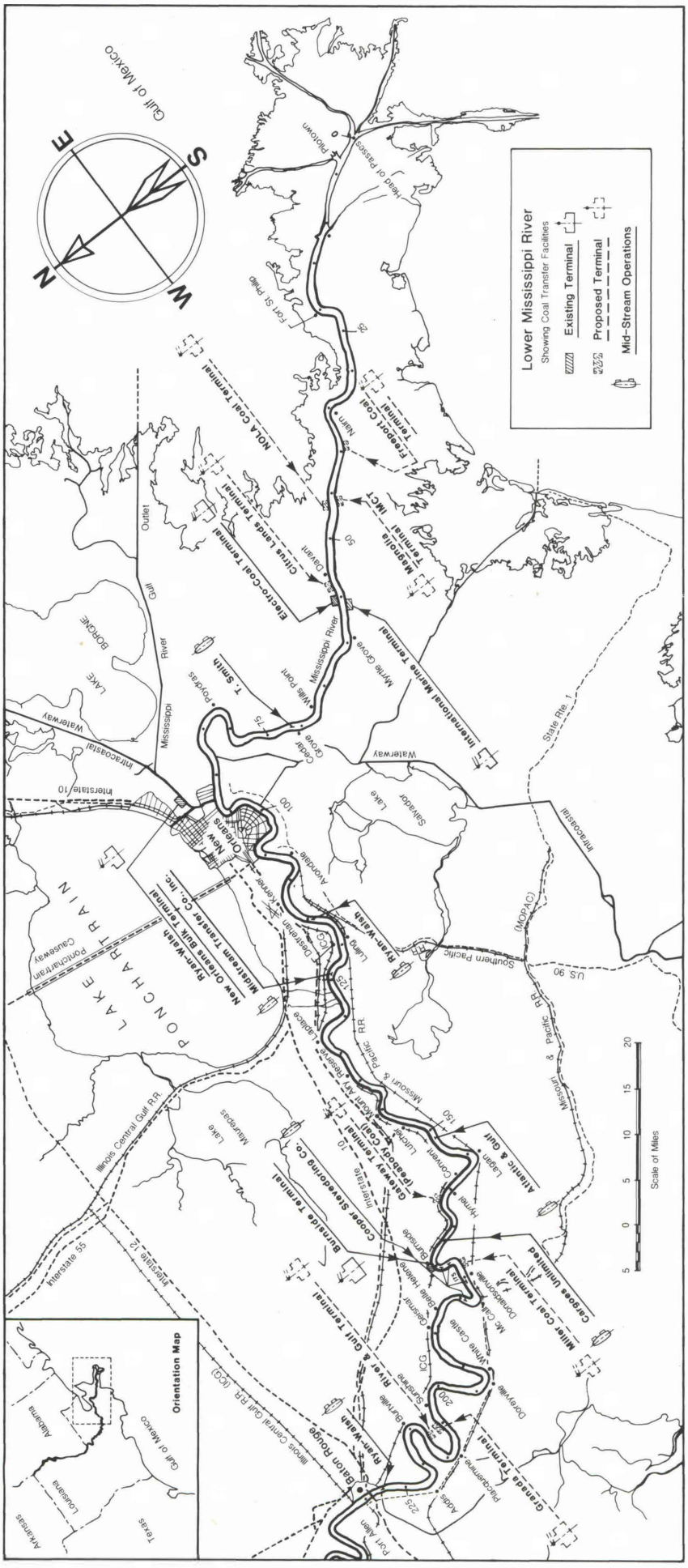


Fig. 22:
Map of the Lower Mississippi River showing coal transfer locations

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