

SOME ASPECTS OF THE TRANSPORTATION OF BITUMINOUS COAL 1/

HYLES E. ROBINSON
 NATIONAL COAL ASSOCIATION
 1130 17th Street, N. W.
 Washington, D. C.

Since the war there have been significant changes in the transportation pattern of bituminous coal. An examination of these shifts will be the major burden of this report. However, for a better understanding of these changes in transportation, it will be useful first to review briefly the general marketing trends and the economic climate in which the postwar coal industry has developed.

The demand for coal is "derived" in the sense that its nature and extent is determined by the demand for the services and products which it helps to create - electricity, steel, such industrial products as chemicals, paper, etc. In other words, where the demand for electricity increases the need for coal and competitive fuels also expands. This relationship is well illustrated by economic developments in the postwar years.

At the end of the war, the pent-up demand for durable goods, particularly household items, appeared insatiable. Both in newly constructed homes and buildings and in those already functioning, the demand for appliances using some form of energy mushroomed. For instance, in 1947, 0.9 percent of our personal consumption expenditures were for electricity, with an additional 0.5 percent for gas. By 1962 these percentages had climbed to 1.5 and 1.0, respectively. An even more significant indicator of the sharp increase in energy consumption is to be found in the figure "average kilowatt-hours used per customer." The following tabulation shows the postwar growth in this statistic.

<u>Average kilowatt-hour per customer</u>	<u>1946</u>	<u>1963</u>	<u>Percent Increase</u>
Residential	1,329	4,442	234.2
Commercial	7,224	23,225	221.5
TOTAL	5,422	13,367	146.5

Increases in the use of other sources of energy have also been substantial.

Along with the sharp increases in the use of coal, oil, and gas, have been certain trends in the economy which though more remotely connected with energy consumption have had considerable impact. Some of the trends in the general economy have had and will continue to have a profound effect upon the coal industry and upon its ability to compete in the energy market. The scope of this paper and limitations of time and space prevent any elaboration. These postwar changes in our economic environment have been: (1) the trend toward the substitution of price competition for service competition; (2) an erosion in the price structure - discount pricing, etc; (3) the trend toward diversification of interests; and (4) the growth of mergers and consolidations. Each of these is having a profound, though not always direct, impact upon the coal industry and each has been instrumental in shaping the transportation pattern for coal. 1/

Before discussing transportation and transportation trends for coal, an understanding of market shifts since the war is essential. This back-drop is shown in Table 1 below which sets forth the profound changes which have materialized since 1946 in the uses of coal.

1/ The term "coal" as used here and throughout the paper refers to bituminous coal and does not include anthracite.

TABLE 1

BITUMINOUS COAL CONSUMPTION
By User Group, 1946-1963 -
 (Thousands of Net Tons)

	1946	1950	1955	1960	1963	Percent 1963 of 1946
Electric Utilities	63,743	63,262	140,550	173,882	209,038	304.1
Coking Coal	63,288	103,445	107,377	81,015	77,633	93.2
General Industry	249,671	177,673	122,465	95,127	99,006	39.7
Domestic Industry	401,702	359,380	370,392	350,024	385,677	96.0
Retail Deliveries	98,684	84,422	53,020	30,405	23,548	23.9
Domestic Consumption	500,386	453,802	423,412	380,429	409,225	81.8
Canada	21,880	23,009	17,185	11,625	13,762	62.9
Overseas	19,329	2,459	34,092	24,870	33,316	172.4
Total Consumption	541,595	479,270	474,689	416,924	456,303	84.3

PERCENT OF TOTAL CONSUMPTION

	1946	1950	1955	1960	1963
Electric Utilities	12.7	13.4	29.6	41.7	45.8
Coking Coal	15.4	21.6	22.6	19.4	17.0
General Industry	46.1	37.1	25.3	22.3	21.7
Domestic Industry	74.2	77.1	73.0	83.9	84.5
Retail Deliveries	18.2	17.6	11.2	7.3	5.2
Domestic Consumption	92.4	94.7	89.2	91.2	89.7
Canada	4.0	4.8	3.6	2.8	3.0
Overseas	3.6	0.5	7.2	6.0	7.3
Total Consumption	100.0	100.0	100.0	100.0	100.0

In the post-war period heavy losses were experienced in the consumption of railroad fuel and in the retail market where gas and oil, particularly the former, caused heavy erosion in coal's markets.

The introduction of the diesel locomotive started the precipitous drop in railroad coal consumption. Decline in retail deliveries was over a longer period, but was very substantial. For purposes of later comparisons, railroad fuel has been included in "general industry." For our purposes, railroad coal consumption today is a negligible factor. The Bureau of Mines recognized this in dropping the separate "Railroads" category of consumption in 1961.

The full impact of the two market changes may be seen in the following:

	Millions of Net Tons		
	1946	1963	Tonnage
Electric Utilities	68.7	209.0	+ 140.3
Railroad Fuel	110.2	1.0(E)	- 109.2
Retail Deliveries	98.7	23.5	- 75.2
Net Change In These Categories			- 44.1

(E) = Estimated

Note that in 1963 the electric utilities consumed 209.0 million tons of coal. In 1946 the combined consumption of the railroads and retail outlets was 208.9 million tons.

Finally, a consideration which has had considerable influence in carving out traffic patterns, is the changing importance of markets. The unit train, for example, is particularly adapted to moving utility coal for a market which was in fourth place in 1946, being exceeded by general industry, railroad fuel (not shown) and retail deliveries, yet by 1963 was in first place.

The changes in coal's other markets were much less spectacular. None could match the rapid growth of utility demand which set the stage for large volume movements and the fall-off in retail which as a result used less volume in shipping.

Distribution statistics in useable detail were not available prior to 1957, at least statistics which could be compared to those of the 1957-1963 period. Statistics in the last seven years have permitted the analysis of coal distribution by method of transportation, by user category, and by districts of origin and states of destination.

Finally, we are using only coal-competitive areas in the transportation statistics which follow. Inclusion of states with heavy gas or oil consumption and using little or no coal would have little usefulness and could add complexity to this presentation.

The transportation patterns for coal in the United States range from the railroads which handle some three-fourths of all shipments, through water and motor carriers to the coal pipeline, which while presently inactive as will be discussed at a later point, still remains an important factor in any consideration of future distribution.

Distribution of coal by each of these media, except the coal pipeline, is included in the quarterly summaries of distribution which have been published by the Bureau of Mines starting with 1958. ^{1/} Because of its confinement to one producer and its relatively limited life, the pipeline does not lend itself to statistical trending and the establishment of firm relationships. Additionally, such information, even if available, could not be made public without disclosure.

We will briefly discuss the coal pipeline after reviewing the 1957-1963 period with respect to the more conventional forms of coal transportation.

Tables 2A and 2B show the changing pattern of coal transportation in the seven-year period, 1957-1963. These figures do not show distribution by mode of transportation, an approach reserved for later treatment in more depth of the pattern and problems of the movement of coal to the electric utility market.

^{1/} Actually these statistics were assembled only for the year 1957, after which they were made on a quarterly basis.

TABLE 2A - CHANGING PATTERNS OF DISTRIBUTION OF BITUMINOUS COAL
BY TYPE OF USER AND BY REGION, 1957-1963
COAL COMPETITIVE AREAS

(000 Tons)

<u>Geographic Region and Type of User</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>
<u>New England</u>	<u>11,909</u>	<u>10,871</u>	<u>11,150</u>	<u>9,313</u>	<u>9,674</u>	<u>9,997</u>	<u>10,017</u>
Electric Utilities	6,012	5,768	6,336	6,000	6,723	7,225	7,770
Coke & Gas Plants	1,345	995	1,090	570	475	456	472
Retail Dealers	1,279	880	558	623	453	450	300
All Other	3,273	3,228	3,166	2,120	2,023	1,866	1,475
<u>Middle Atlantic</u>	<u>92,596</u>	<u>74,836</u>	<u>75,082</u>	<u>76,173</u>	<u>72,076</u>	<u>76,107</u>	<u>79,492</u>
Electric Utilities	31,662	28,341	29,800	30,610	30,761	33,092	34,300
C. & G.	38,448	26,024	25,613	26,904	23,765	24,047	26,138
R. D.	2,498	2,819	1,833	1,781	1,641	1,539	1,357
A. O.	19,988	17,652	17,786	16,878	15,909	17,429	17,697
<u>East North Central</u>	<u>170,697</u>	<u>147,238</u>	<u>161,242</u>	<u>158,125</u>	<u>151,278</u>	<u>159,391</u>	<u>164,423</u>
Electric Utilities	66,436	61,822	68,360	69,572	68,199	74,750	78,944
C. & G.	38,757	26,011	30,103	30,709	27,127	26,496	27,709
R. D.	21,321	19,257	19,333	17,508	16,197	15,956	14,222
A. O.	44,183	40,148	43,446	40,336	39,755	42,189	43,548
<u>West North Central</u>	<u>20,824</u>	<u>19,702</u>	<u>21,023</u>	<u>22,571</u>	<u>20,920</u>	<u>22,520</u>	<u>23,242</u>
Electric Utilities	8,278	8,364	9,152	10,541	10,254	12,218	13,179
C. & G.	1,518	1,041	1,131	945	592	768	776
R. D.	4,079	3,858	4,051	4,125	3,651	3,261	2,602
A. O.	6,949	6,439	6,689	6,960	6,423	6,273	6,685
<u>South Atlantic</u>	<u>52,560</u>	<u>49,789</u>	<u>50,602</u>	<u>52,547</u>	<u>55,316</u>	<u>57,891</u>	<u>63,816</u>
Electric Utilities	22,251	22,734	26,334	27,167	29,825	31,951	35,977
C. & G.	11,321	9,561	7,596	8,441	8,307	8,316	9,008
R. D.	4,765	4,859	3,561	3,713	3,160	3,334	3,203
A. O.	14,223	12,635	13,191	13,226	14,024	14,290	15,628
<u>East South Central</u>	<u>43,283</u>	<u>36,479</u>	<u>38,907</u>	<u>41,556</u>	<u>40,771</u>	<u>42,709</u>	<u>47,418</u>
Electric Utilities	23,572	21,689	24,437	26,534	27,116	28,862	32,436
C. & G.	10,380	7,585	8,065	8,391	7,241	7,300	7,641
R. D.	2,494	2,496	1,904	1,959	1,863	1,810	1,999
A. O.	6,837	4,709	4,501	4,672	4,551	4,737	5,342
<u>Mountain</u>	<u>8,779</u>	<u>7,362</u>	<u>7,346</u>	<u>8,536</u>	<u>8,932</u>	<u>8,898</u>	<u>10,823</u>
Electric Utilities	1,437	1,541	2,327	2,780	3,407	3,788	5,832
C. & G.	3,772	2,830	2,297	3,050	2,886	2,297	2,465
R. D.	1,350	1,291	1,154	1,167	1,117	1,193	1,122
A. O.	2,220	1,700	1,568	1,539	1,522	1,620	1,404
<u>Total Coal Competitive Regions</u>	<u>400,648</u>	<u>346,277</u>	<u>365,432</u>	<u>368,821</u>	<u>358,967</u>	<u>377,513</u>	<u>399,231</u>
Electric Utilities	159,648	150,259	166,746	173,204	176,285	191,886	208,438
C. & G.	105,541	74,047	75,895	79,010	70,393	69,670	74,209
R. D.	37,786	35,460	32,444	30,876	28,082	27,543	24,805
A. O.	97,673	86,511	90,347	85,731	84,207	88,404	91,740

TABLE 2B - CHANGING PATTERNS OF DISTRIBUTION OF BITUMINOUS COAL
 BY TYPE OF USER AND BY REGION, 1957-1963
 COAL COMPETITIVE AREAS
 (1957 = 100)

<u>Geographic Region and Type of User</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>
<u>New England</u>	<u>91.3</u>	<u>93.6</u>	<u>78.2</u>	<u>81.2</u>	<u>63.9</u>	<u>84.1</u>
Electric Utilities	95.9	105.4	99.8	111.8	120.2	129.2
Coke & Gas Plants	74.0	81.0	42.4	35.3	33.9	35.1
Retail Dealers	68.8	43.6	48.7	35.4	35.2	23.5
All Other	98.6	96.7	64.8	61.8	57.0	45.1
<u>Middle Atlantic</u>	<u>80.8</u>	<u>81.1</u>	<u>82.3</u>	<u>77.8</u>	<u>82.2</u>	<u>85.8</u>
Electric Utilities	89.5	94.1	96.7	97.2	104.5	103.3
C. & G.	67.7	66.6	70.0	61.8	52.5	68.0
R. D.	112.9	75.4	71.3	65.7	61.6	54.3
A. O.	88.3	89.0	84.4	79.6	87.2	88.5
<u>East North Central</u>	<u>86.3</u>	<u>94.5</u>	<u>92.6</u>	<u>88.5</u>	<u>93.4</u>	<u>96.3</u>
Electric Utilities	93.1	102.9	104.7	102.7	112.5	118.8
C. & G.	67.1	77.7	79.2	70.0	68.4	71.5
R. D.	90.3	90.7	82.1	76.0	74.8	66.7
A. O.	90.9	98.3	91.3	90.0	95.5	98.6
<u>West North Central</u>	<u>94.6</u>	<u>101.0</u>	<u>108.4</u>	<u>100.5</u>	<u>103.1</u>	<u>111.6</u>
Electric Utilities	101.0	110.6	127.3	123.9	147.6	159.2
C. & G.	68.6	74.5	62.3	39.0	50.6	51.1
R. D.	94.6	99.3	101.1	89.5	79.9	63.8
A. O.	92.7	96.3	100.2	92.4	90.3	96.2
<u>South Atlantic</u>	<u>94.7</u>	<u>96.4</u>	<u>100.0</u>	<u>105.2</u>	<u>110.1</u>	<u>121.4</u>
Electric Utilities	102.2	118.3	122.1	134.0	143.6	161.7
C. & G.	84.5	67.1	74.6	73.4	73.5	79.6
R. D.	102.0	74.7	77.9	66.3	70.0	67.2
A. O.	88.8	92.7	93.0	98.6	100.5	109.9
<u>East South Central</u>	<u>84.3</u>	<u>89.9</u>	<u>96.0</u>	<u>94.2</u>	<u>98.7</u>	<u>109.6</u>
Electric Utilities	92.0	103.7	112.6	115.0	122.4	137.6
C. & G.	73.1	77.7	80.8	69.8	70.3	73.6
R. D.	100.1	76.3	78.5	74.7	72.6	80.2
A. O.	68.9	65.8	68.3	66.6	69.3	78.1
<u>Mountain</u>	<u>83.9</u>	<u>83.7</u>	<u>97.2</u>	<u>101.7</u>	<u>101.4</u>	<u>123.3</u>
Electric Utilities	107.2	161.9	193.5	237.1	263.6	405.8
C. & G.	75.0	50.9	80.9	76.5	60.9	65.3
R. D.	95.6	85.5	86.4	82.7	88.4	83.1
A. O.	76.6	70.6	69.3	68.6	73.0	63.2
<u>Total Coal Competitive Regions</u>	<u>86.4</u>	<u>91.2</u>	<u>92.1</u>	<u>89.6</u>	<u>94.2</u>	<u>99.6</u>
Electric Utilities	94.1	104.4	108.5	110.4	120.2	130.6
C. & G.	70.2	71.9	74.9	65.7	66.0	70.3
R. D.	93.8	85.9	81.7	74.3	72.9	65.6
A. O.	88.6	92.5	87.8	86.2	90.5	94.0

In the seven-year period total coal changes in distribution, by regions, have been these:

Region	Percent Total Coal-Competitive Tonnage		Tonnage Change 1957 to 1963		Percent Change Since 1957	
	1957	1963	Gain	Loss	Increase	Decrease
	New England	3.0	2.5	-	1,892	-
Middle Atlantic	23.1	19.9	-	13,104	-	14.2
East North Central	42.6	41.2	-	6,274	-	3.7
West North Central	5.2	5.8	2,418	-	11.6	-
South Atlantic	13.1	16.0	11,256	-	21.4	-
East South Central	10.8	11.9	4,135	-	9.6	-
Mountain	2.2	2.7	2,044	-	23.3	-
TOTAL	100.0	100.0	19,853	21,270	-	0.4

The changing distribution pattern for each of the categories we will discuss follows:

ELECTRIC UTILITIES

Region	Percent Total Coal-Competitive Tonnage		Tonnage Change 1957 to 1963		Percent Change Since 1957	
	1957	1963	Gain	Loss	Increase	Decrease
	New England	3.8	3.7	1,758	-	29.2
Middle Atlantic	19.8	16.5	2,638	-	8.3	-
East North Central	41.6	37.9	12,508	-	18.8	-
West North Central	5.2	6.3	4,901	-	59.2	-
South Atlantic	13.9	17.3	13,726	-	61.7	-
East South Central	14.8	15.6	8,864	-	37.6	-
Mountain	6.9	2.7	4,395	-	305.8	-
TOTAL	100.0	100.0	48,790	-	30.6	-

The largest consumption increases among the users of coal have been in the electric utilities, the only consumption category which has seen an increase in each of the seven regions. However, the New England, Middle Atlantic, and East North Central regions, the only ones with decreases in total distribution, show the smallest increases in utility consumption.

Before discussing the transportation of utility coal in greater depth, the regional distribution breakdown for the other major consumer groups will be shown and briefly treated.

COKE AND GAS PLANTS

Region	Percent Total Coal-Competitive Tonnage		Tonnage Change 1957 to 1963		Percent Change Since 1957	
	1957	1963	Gain	Loss	Increase	Decrease
	New England	1.3	.7	-	873	-
Middle Atlantic	36.5	35.2	-	12,310	-	32.0
East North Central	36.7	37.3	-	11,048	-	28.5
West North Central	1.4	1.1	-	742	-	48.9
South Atlantic	10.7	12.1	-	2,313	-	20.4
East South Central	9.8	10.3	-	2,739	-	26.4
Mountain	3.6	3.3	-	1,307	-	34.7
TOTAL	100.0	100.0	-	31,332	-	29.7

The fact that during this period distribution of coking coal was down 29.7 percent, whereas the total consumption in all four groups was down by slightly more than four-tenths of one percent, can be attributed to a large extent to the increased efficiency in the use of coal in the steel-making process. An exact measurement of this in isolation from other factors causing the decline would be difficult.

RETAIL DELIVERIES

Region	Percent Total Coal-Competitive Tonnage		Tonnage Change 1957 to 1963		Percent Change Since 1957	
	1957	1963	Gain	Loss	Increase	Decrease
	New England	3.4	1.2	-	979	-
Middle Atlantic	6.6	5.5	-	1,141	-	45.7
East North Central	56.4	57.3	-	7,099	-	33.3
West North Central	10.8	10.5	-	1,477	-	36.2
South Atlantic	12.6	12.9	-	1,562	-	32.8
East South Central	6.6	8.1	-	495	-	19.8
Mountain	3.6	4.5	-	228	-	16.9
TOTAL	100.0	100.0	-	12,981	-	34.4

The general decline in retail deliveries over this period is independent of mode of transport employed. On the other hand, as will be discussed later, the growth in utility consumption, as brought out in the distribution data, has been affected, either directly or indirectly, by the means of transportation.

GENERAL INDUSTRY

Region	Percent Total Coal-Competitive Tonnage		Tonnage Change 1957 to 1963		Percent Change Since 1957	
	1957	1963	Gain	Loss	Increase	Decrease
	New England	3.4	1.6	-	1,798	-
Middle Atlantic	20.5	19.3	-	2,291	-	11.5
East North Central	45.1	47.4	-	635	-	1.4
West North Central	7.1	7.3	-	264	-	3.8
South Atlantic	14.6	17.0	1,405	-	9.9	-
East South Central	7.0	5.8	-	1,495	-	21.9
Mountain	2.3	1.6	-	816	-	36.8
TOTAL	100.0	100.0	1,405	7,299	-	6.0

This is an important market for coal, but one where the constituent elements are quite diverse and where transportation patterns are less significant than in the distribution of utility coal. Yet in 1964 to the mine operators alone this field will be worth in excess of half-a-billion dollars.

Competition from other sources of energy, particularly from oil, underlies some of these changes. This is especially true in the New England, Middle Atlantic and East South Central regions which, in 1957, accounted for 30.9 percent of all consumption. By 1963 this figure had dropped to 26.7 percent. Reduced costs of transportation, such as are made possible through the operation of unit trains, have not yet been applied to this market area, to a large degree due to the heterogeneous character of demand.

For obvious reasons, we will not examine the remaining markets for coal, Canadian and overseas exports, which do not lend themselves to transportation as developed in this paper.

The last half of this paper will examine 1957-1963 trends in the distribution of coal by mode of transportation, excluding the coal pipeline, and will conclude with an analysis of the manner in which utility coal has been shipped. Because we have more complete data on the electric utility market for coal, distribution for this market has been assigned a major role in this report. Also, fortunately, we have excellent statistics covering railway and barge movements of utility coal. These two methods of transportation account for the bulk of utility movements.

TABLE 3A
 CHANGING PATTERNS OF DISTRIBUTION OF BITUMINOUS COAL (ALL USERS),
 BY METHOD OF TRANSPORTATION AND BY REGION, 1957-1963
 COAL COMPETITIVE AREAS (EXCLUDES WEST SOUTH CENTRAL AND PACIFIC)

Geographic Region Method of Movement	Thousands of Net Tons						
	1957	1958	1959	1960	1961	1962	1963
<u>New England</u>	<u>11,909</u>	<u>10,871</u>	<u>11,150</u>	<u>9,313</u>	<u>9,674</u>	<u>9,997</u>	<u>10,017</u>
All-rail	4,161	3,643	4,310	4,038	4,373	4,458	3,644
Tidewater	7,748	7,228	6,840	5,275	5,301	5,539	6,373
<u>Middle Atlantic</u>	<u>92,596</u>	<u>74,836</u>	<u>75,082</u>	<u>76,173</u>	<u>72,076</u>	<u>76,107</u>	<u>79,492</u>
All-rail	40,566	32,445	35,530	35,102	34,132	36,889	35,513
River & Ex-River	23,348	17,082	16,633	17,718	16,519	17,262	19,353
Great Lakes	4,505	3,694	2,200	2,490	2,385	2,711	2,443
Tidewater	12,372	11,551	10,994	11,220	10,355	9,144	11,215
Truck	10,255	7,988	9,720	9,643	6,928	10,101	10,968
Tramway, Conveyor, & Private Railroad	1,550	2,076	-	-	1,757	-	-
<u>East North Central</u>	<u>170,697</u>	<u>147,238</u>	<u>161,242</u>	<u>158,125</u>	<u>151,278</u>	<u>159,391</u>	<u>164,423</u>
All-rail	96,146	78,679	82,241	77,224	69,267	73,778	76,775
River & Ex-River	29,701	26,707	29,398	31,271	33,767	35,381	34,625
Great Lakes	27,149	24,453	29,665	28,408	27,457	28,192	31,333
Truck	15,907	17,399	19,438	21,222	20,787	22,040	21,690
T., C. & P.R.	1,794	-	-	-	-	-	-
<u>West North Central</u>	<u>20,824</u>	<u>19,702</u>	<u>21,023</u>	<u>22,571</u>	<u>20,920</u>	<u>22,520</u>	<u>23,242</u>
All-rail	11,777	10,705	11,472	12,542	11,124	12,139	12,657
River & Ex-River	2,575	2,854	3,492	3,469	3,882	4,135	4,278
Great Lakes	3,510	2,901	3,092	3,984	3,503	3,001	3,214
Truck	2,962	3,242	2,967	2,576	2,411	3,195	3,093
<u>South Atlantic</u>	<u>52,560</u>	<u>49,739</u>	<u>50,682</u>	<u>52,547</u>	<u>55,316</u>	<u>57,891</u>	<u>63,816</u>
All-rail	33,529	31,838	32,320	33,576	34,939	36,755	41,408
River & Ex-River	9,492	8,835	8,526	8,501	9,779	9,638	10,473
Tidewater	6,205	6,061	4,986	5,610	5,444	5,840	5,889
Truck	2,142	3,055	4,350	4,860	3,101	5,658	6,046
T., C. & P.R.	1,192	-	-	-	2,053	-	-
<u>East South Central</u>	<u>43,283</u>	<u>36,479</u>	<u>38,907</u>	<u>41,556</u>	<u>40,771</u>	<u>42,709</u>	<u>47,418</u>
All-rail	25,036	21,308	23,200	26,789	27,713	29,214	31,843
River & Ex-River	13,450	10,621	11,021	10,870	9,654	9,824	10,703
Truck	3,066	4,550	4,686	3,897	3,404	3,671	4,872
T., C. & P.R.	1,731	-	-	-	-	-	-
<u>Mountain</u>	<u>8,779</u>	<u>7,362</u>	<u>7,346</u>	<u>8,536</u>	<u>8,932</u>	<u>8,398</u>	<u>10,823</u>
All-rail	7,407	5,921	6,006	6,518	6,491	6,706	7,026
Truck	1,294	1,368	1,287	1,993	2,338	2,094	3,732
T., C. & P.R.	78	53	53	25	103	98	65
<u>Total Coal Competitive Regions</u>	<u>400,648</u>	<u>346,277</u>	<u>365,432</u>	<u>368,821</u>	<u>358,967</u>	<u>377,513</u>	<u>399,231</u>
All-rail	218,622	184,539	195,579	195,789	188,039	199,989	208,866
River & Ex-River	78,566	66,099	69,575	71,829	73,601	76,240	79,432
Great Lakes	35,164	31,048	34,957	34,882	33,345	33,904	36,990
Tidewater	26,325	24,840	22,820	22,105	21,100	20,523	23,477
Truck	35,626	37,622	42,448	44,191	38,969	46,759	50,401
T., C. & P.R.	6,345	2,129	53	25	3,913	98	65

TABLE 3B
 CHANGING PATTERNS OF DISTRIBUTION OF BITUMINOUS COAL (ALL USERS),
 BY METHOD OF TRANSPORTATION AND BY REGION, 1957-1963
 COAL COMPETITIVE AREAS (EXCLUDES WEST SOUTH CENTRAL AND PACIFIC)

Geographic Region Method of Movement	Index, 1957=100.0						
	1957	1958	1959	1960	1961	1962	1963
<u>New England</u>	<u>100.0</u>	<u>91.3</u>	<u>93.6</u>	<u>78.2</u>	<u>81.2</u>	<u>83.9</u>	<u>84.1</u>
All-rail		87.6	103.6	97.0	105.1	107.1	87.6
Tidewater		93.3	88.3	68.1	68.4	71.5	82.3
<u>Middle Atlantic</u>	<u>100.0</u>	<u>80.8</u>	<u>81.1</u>	<u>82.3</u>	<u>77.8</u>	<u>82.2</u>	<u>85.8</u>
All-rail		80.0	87.6	86.5	84.1	90.9	87.5
River & ex-river		73.2	71.3	75.9	70.3	73.9	82.9
Great Lakes		82.0	48.8	55.3	52.9	60.2	54.2
Tidewater		93.4	88.2	90.7	83.7	73.9	90.6
Truck		85.3	82.3	81.7	73.6	85.6	92.9
T.,C.& P.R.))))))
<u>East North Central</u>	<u>100.0</u>	<u>86.3</u>	<u>94.5</u>	<u>92.6</u>	<u>88.6</u>	<u>93.4</u>	<u>96.3</u>
All-rail		81.8	85.5	80.3	72.0	76.7	79.9
River & ex-river		89.9	100.7	105.3	113.7	119.1	116.6
Great Lakes		90.1	109.3	104.6	101.1	103.8	115.4
Truck		98.3	109.8	119.9	117.4	124.5	122.5
T.,C.& P.R.))))))
<u>West North Central</u>	<u>100.0</u>	<u>94.6</u>	<u>101.0</u>	<u>108.4</u>	<u>100.5</u>	<u>108.1</u>	<u>111.6</u>
All-rail		90.9	97.4	106.5	94.5	103.5	107.5
River & ex-river		110.8	135.6	134.7	150.8	160.6	166.1
Great Lakes		82.6	88.1	113.5	99.8	85.5	91.6
Truck		109.5	100.2	87.0	81.4	107.9	104.4
<u>South Atlantic</u>	<u>100.0</u>	<u>94.7</u>	<u>96.4</u>	<u>100.0</u>	<u>105.2</u>	<u>110.1</u>	<u>121.4</u>
All-rail		95.0	97.9	100.1	104.2	109.6	123.5
River & ex-river		93.1	89.8	89.6	103.0	101.5	110.3
Tidewater		97.7	80.4	90.4	87.7	94.1	94.9
Truck		91.6	130.5	145.8	154.6	169.7	181.3
T.,C.& P.R.))))))
<u>East South Central</u>	<u>100.0</u>	<u>84.3</u>	<u>89.9</u>	<u>96.0</u>	<u>94.2</u>	<u>98.7</u>	<u>109.6</u>
All-rail		85.1	92.7	107.0	110.7	116.7	127.2
River & ex-river		79.0	81.9	80.8	71.8	73.0	79.6
Truck		94.9	97.7	81.2	71.0	76.5	101.6
T.,C.& P.R.))))))
<u>Mountain</u>	<u>100.0</u>	<u>83.9</u>	<u>83.7</u>	<u>97.2</u>	<u>101.7</u>	<u>101.4</u>	<u>123.3</u>
All-rail		79.9	81.1	88.0	87.6	90.5	94.9
Truck		105.0	97.7	147.1	177.9	159.8	276.7
T.,C.& P.R.))))))
<u>Total Coal Competitive Regions</u>	<u>100.0</u>	<u>86.4</u>	<u>91.2</u>	<u>92.1</u>	<u>89.6</u>	<u>94.2</u>	<u>99.6</u>
All-rail		84.4	89.5	89.6	86.0	91.5	95.5
River & ex-river		84.1	88.6	91.4	93.7	97.0	101.1
Great Lakes		88.3	99.4	99.2	94.8	96.4	105.2
Tidewater		94.4	86.7	84.0	80.2	78.0	89.2
Truck		94.7	101.3	105.3	102.2	111.6	120.2
T.,C.& P.R.))))))

First taking our coal-competitive states as a whole, all-rail has not quite held its own since 1957, with 95.5 percent of the movement in 1963. ^{1/} However, the 1963 percentage vs. 1957 is better than that of any of the intervening years. On the other hand both "River and Ex-River" (part rail - part water) and "Great Lakes" movements have strongly increased their traffic in coal since 1958, after a dip from 1957 levels.

The trucking of coal in the over-all picture has risen by one-fifth since 1957, with a strong and consistent increase, though reversals in the rate of climb were experienced in 1958 and 1961. Until 1962, coal consumption through tidewater delivery had been declining. By the development of volume movements for utilities waterway operators jumped from 78.0 to 89.2 percent of 1957. Undoubtedly much of this was at the expense of the rails though exact measures of impact are not available.

The following regional summaries of trends by mode of transport reflect the changes which are taking place in the consumption of coal, both geographically and as between regions.

ALL-RAIL

<u>Region</u>	<u>Percent Total</u>		<u>Tonnage Change</u>		<u>Percent Change</u>	
	<u>Coal-Competitive</u>		<u>1957 to 1963</u>		<u>Since 1957</u>	
	<u>1957</u>	<u>1963</u>	<u>Gain</u>	<u>Loss</u>	<u>Increase</u>	<u>Decrease</u>
			<u>(000)</u>	<u>(000)</u>		
New England	1.9	1.7	-	517	-	12.4
Middle Atlantic	18.6	17.0	-	5,053	-	12.5
East North Central	43.9	36.8	-	19,371	-	20.1
West North Central	5.4	6.1	380	-	7.5	-
South Atlantic	15.3	19.8	7,879	-	23.5	-
East South Central	11.5	15.2	6,807	-	27.2	-
Mountain	3.4	3.4	-	381	-	5.1
TOTAL	100.0	100.0	-	9,756	-	4.5

The largest rail loss in volume occurred in the East North Central Region, where the erosion in traffic reached 19,371,000 tons, or a fall-off of 7.1 percentage points in the proportion to total in this largest region with respect to rail traffic. As noted later, most of this loss went to river and ex-river. The growth in water transport of coal in this heavy rail traffic region can be assigned in large part to inter-energy competitive forces.

The gain in rail traffic in the South Atlantic and East South Central Regions, a combined "plus" of 8.2 percentage points, is largely attributable to volume movement of coal in trainloads.

RIVER AND EX-RIVER MOVEMENTS

Only five of the seven regions have river transportation. Of the other two, New England has tidewater movements while the Mountain Region has no water transportation of any kind.

River and ex-river movements of the five regions are shown for the seven-year span in the table below. These movements gained in three of the five regions, with the gains in the East North Central States, as noted above, roughly equal to their

^{1/} We have firm data for only the first half of 1964. Trends since the introduction of the unit train will be discussed at a later point.

loss in rail importance. A substantial loss in river and ex-river importance in the East South Central Region just about equalled its rise in rail proportions. Obviously the services offered by the railroads and generally favorable rates have siphoned off much of this business.

RIVER AND EX-RIVER

<u>Region</u>	Percent Total Coal-Competitive Tonnage		Tonnage Change 1957 to 1963		Percent Change Since 1957	
	<u>1957</u>	<u>1963</u>	<u>Gain</u>	<u>Loss</u>	<u>Increase</u>	<u>Decrease</u>
			(000)	(000)		
Middle Atlantic	29.7	24.3	-	3,995	-	17.1
East North Central	37.8	43.6	4,924	-	16.6	-
West North Central	3.3	5.4	1,703	-	66.1	-
South Atlantic	12.1	13.2	981	-	10.3	-
East South Central	<u>17.1</u>	<u>13.5</u>	-	<u>2,747</u>	-	<u>20.4</u>
TOTAL	100.0	100.0	866	-	1.1	-

GREAT LAKES MOVEMENTS

The chief point of significance in the Great Lakes figures is the substantial growth in the East North Central volume. As pointed out above, rail traffic has declined in relative importance in this area, while river and ex-river importance has increased to a lesser extent but still showing a very important growth. While hardly a revolution in transportation, the switch is most pronounced. As will be pointed out later, much of this increase in water movement has been in utility coal.

GREAT LAKES

<u>Region</u>	Percent Total Coal-Competitive Tonnage		Tonnage Change 1957 to 1963		Percent Change Since 1957	
	<u>1957</u>	<u>1963</u>	<u>Gain</u>	<u>Loss</u>	<u>Increase</u>	<u>Decrease</u>
			(000)	(000)		
Middle Atlantic	12.8	6.6	-	2,062	-	45.3
East North Central	77.2	84.7	4,184	-	15.4	-
West North Central	<u>10.0</u>	<u>8.7</u>	-	<u>296</u>	-	<u>8.4</u>
TOTAL	100.0	100.0	1,826	-	5.2	-

TIDEWATER MOVEMENTS

In the case of tidewater transportation of coal, the only three regions with such movements showed decreases ranging from 5.1 percent for the South Atlantic states to 17.7 percent in the New England states. While there was a small adjustment in the seven-year period in the proportion of tidewater traffic by region, overall decreases were experienced throughout the tidewater area.

TIDEWATER

<u>Region</u>	Percent Total Coal-Competitive Tonnage		Tonnage Change 1957 to 1963		Percent Change Since 1957	
	<u>1957</u>	<u>1963</u>	<u>Gain</u>	<u>Loss</u>	<u>Increase</u>	<u>Decrease</u>
			(000)	(000)		
New England	29.4	27.1	-	1,375	-	17.7
Middle Atlantic	47.0	47.8	-	1,157	-	9.4
South Atlantic	<u>23.6</u>	<u>25.1</u>	-	<u>316</u>	-	<u>5.1</u>
TOTAL	100.0	100.0	-	2,848	-	10.8

TRUCK, TRAMWAY AND CONVEYOR MOVEMENTS

Unfortunately it is not possible to separate truck movements from tramway and conveyor in all of the regions. However, truck operations considerably exceed those of the other two types. In 1957, 41,971,000 tons were transported by the three media, or 10.5 percent of total movement. By 1963 the total was 50,466,000, or 12.6 percent of over-all traffic. The significant fact is that in all regions except New England, and that by a small decrease, traffic expanded, with the largest growths in the East North Central, South Atlantic, and Mountain Regions.

The important newer developments in the transportation of coal - the unit train, the coal pipeline, and volume movements - have all been associated with the shipment of coal for use by the electric utility industry. This section of the report reinforces the earlier sections by showing how the utilities have participated in the changing transportation pattern. In fact, because of its size among the customers of coal, the utility industry's experience with transportation actually did much to establish the over-all pattern.

Table 4 below covers the methods of distributing utility coal, by region of destination, for the period 1957-1963.

TABLE 4A
ELECTRIC UTILITY COAL, PATTERNS OF DISTRIBUTION,
BY METHOD OF TRANSPORTATION AND BY REGION, 1957-1963
COAL COMPETITIVE AREAS (EXCLUDES WEST SOUTH CENTRAL AND PACIFIC)

Geographic Region Method of Movement	Thousands of Net Tons						
	1957	1958	1959	1960	1961	1962	1963
<u>New England</u>	<u>6,012</u>	<u>5,768</u>	<u>6,336</u>	<u>6,000</u>	<u>6,723</u>	<u>7,225</u>	<u>7,770</u>
All-rail	1,607	1,199	2,081	2,313	2,875	3,005	2,430
River & ex-river	-	-	-	-	-	-	-
Great Lakes	-	-	-	-	-	-	-
Tidewater	4,405	4,569	4,255	3,687	3,848	4,220	5,340
Truck	-	-	-	-	-	-	-
T.,C.& P.R.	-	-	-	-	-	-	-
<u>Middle Atlantic</u>	<u>31,662</u>	<u>28,341</u>	<u>29,800</u>	<u>30,610</u>	<u>30,761</u>	<u>33,092</u>	<u>34,300</u>
R.R.	13,136	11,951	13,282	14,001	15,402	17,433	17,414
River	2,017	2,023	2,004*	2,196	2,257	2,291	2,303
Great Lakes	2,053	1,434	1,271*	1,143	812	1,269	881
Tidewater	9,058	8,084	8,289	8,900	8,605	7,459	8,801
Truck	5,398	3,333	4,954	4,370	2,409	4,640	4,901
T.,C.& P.R.)	1,516	-	-	1,276	-	-
<u>East North Central</u>	<u>66,436</u>	<u>61,822</u>	<u>68,360</u>	<u>69,572</u>	<u>68,199</u>	<u>74,750</u>	<u>78,944</u>
R.R.	28,144	23,811	23,509	22,389	20,222	23,180	26,123
River	19,087	19,185	21,343	23,209	25,471	27,247	27,273
Great Lakes	11,940	10,707	13,434	12,607	11,465	12,726	14,467
Tidewater	-	-	-	-	-	-	-
Truck	5,533	8,119	10,074	11,367	11,041	11,597	11,081
T.,C.& P.R.	1,732)	-	-	-	-	-
<u>West North Central</u>	<u>8,278</u>	<u>8,364</u>	<u>9,152</u>	<u>10,541</u>	<u>10,254</u>	<u>12,218</u>	<u>13,179</u>
R.R.	5,011	4,219	5,070	6,036	5,689	6,562	7,145
River	1,781	2,235	2,760	3,004	3,359	3,636	3,785
Great Lakes	685	840	539	987	791	759	751
Tidewater	-	-	-	-	-	-	-
Truck	801	1,070	783	514	415	1,261	1,498
T.,C.& P.R.	-	-	-	-	-	-	-
<u>South Atlantic</u>	<u>22,251</u>	<u>22,734</u>	<u>26,334</u>	<u>27,167</u>	<u>29,825</u>	<u>31,951</u>	<u>35,977</u>
R.R.	15,615	16,426	18,314*	18,309*	19,563*	21,418	25,133
River	3,231	3,262	3,342	3,754	4,754	4,828	4,917
Great Lakes	-	-	-	-	-	-	-
Tidewater	1,437	1,572	1,491*	1,465*	1,414*	1,388	1,485
Truck	1,198	1,474	3,187	3,639	2,167	4,317	4,442
T.,C.& P.R.	770	-	-	-	1,927	-	-
<u>East South Central</u>	<u>23,572</u>	<u>21,689</u>	<u>24,437</u>	<u>26,534</u>	<u>27,116</u>	<u>28,862</u>	<u>32,436</u>
R.R.	9,158	9,491	11,640	14,479	16,638	18,036	19,963
River	11,178	8,545	9,144	9,079	7,823	8,081	8,756
Great Lakes	-	-	-	-	-	-	-
Tidewater	-	-	-	-	-	-	-
Truck	1,505	3,653	3,653	2,976	2,655	2,745	3,717
T.,C.& P.R.	1,731	-	-	-	-	-	-

* Estimated from incomplete data.

TABLE 4A - Cont'd.
 ELECTRIC UTILITY COAL, PATTERNS OF DISTRIBUTION,
 BY METHOD OF TRANSPORTATION AND BY REGION, 1957-1963
 COAL COMPETITIVE AREAS (EXCLUDES WEST SOUTH CENTRAL AND PACIFIC)

Geographic Region Method of Movement	Thousands of Net Tons						
	1957	1958	1959	1960	1961	1962	1963
<u>Mountain</u>	1,437	1,541	2,327	2,780	3,407	3,738	5,232
R.R.	1,103	938	1,702	1,455	1,621	2,190	2,545
River	-	-	-	-	-	-	-
Great Lakes	-	-	-	-	-	-	-
Tidewater	-	-	-	-	-	-	-
Truck	298	550	572	1,300	1,633	1,500	3,222
T.,C.& P.R.	36	53	53	25	103	98	65
<u>Total Coal Competitive</u>							
Regions	159,648	150,259	166,746	173,204	175,235	191,886	208,438
All-rail	73,774	68,035	75,593	78,982	82,010	91,824	100,753
River & ex-river	37,294	35,250	38,593	41,242	43,664	46,033	47,034
Great Lakes	14,678	12,981	15,244	14,737	13,060	14,754	16,099
Tidewater	14,900	14,225	14,035	14,052	13,867	13,067	15,626
Truck	14,733	19,715	23,223	24,166	20,370	26,060	28,861
T.,C.& P.R.	4,269	53	53	25	3,306	98	65

TABLE 4B
 Index, 1957=100.0

<u>New England</u>	100.0	95.9	105.4	99.8	111.8	120.2	129.2
All-rail	100.0	74.6	129.5	143.9	178.9	167.0	151.2
River & ex-river	-	-	-	-	-	-	-
Great Lakes	-	-	-	-	-	-	-
Tidewater	100.0	103.7	96.6	83.7	87.4	95.8	121.2
Truck	-	-	-	-	-	-	-
T.,C.& P.R.	-	-	-	-	-	-	-
<u>Middle Atlantic</u>	100.0	89.5	94.1	96.7	97.2	104.5	108.3
R.R.	100.0	91.0	101.1	106.6	117.3	132.7	132.6
River	100.0	100.3	99.4	108.9	111.9	113.6	114.2
Great Lakes	100.0	69.8	61.9	55.7	39.6	61.8	42.9
Tidewater	100.0	89.2	91.5	98.3	95.0	82.3	97.2
Truck	100.0	89.8	91.8	81.0	68.3	66.0	90.8
T.,C.& P.R.)))))))
<u>East North Central</u>	100.0	93.1	102.9	104.7	102.7	112.5	118.8
R.R.	100.0	84.6	83.5	79.6	71.9	82.4	92.8
River	100.0	100.5	111.8	121.6	133.4	142.8	142.9
Great Lakes	100.0	89.7	112.5	105.6	96.0	106.6	121.2
Tidewater	-	-	-	-	-	-	-
Truck)100.0	111.8	132.7	156.5	152.0	159.6	152.5
T.,C.& P.R.)))))))

TABLE 4B - Cont'd.
ELECTRIC UTILITY COAL, PATTERNS OF DISTRIBUTION,
BY METHOD OF TRANSPORTATION AND BY REGION, 1957-1963
 COAL COMPETITIVE AREAS (EXCLUDES WEST SOUTH CENTRAL AND PACIFIC)

Geographic Region Method of Movement	Index, 1957=100.0						
	1957	1958	1959	1960	1961	1962	1963
<u>West North Central</u>	100.0	101.0	110.6	127.3	123.9	147.6	159.2
R.R.	100.0	84.2	101.2	120.5	113.5	131.0	142.6
River	100.0	125.5	155.0	168.7	183.6	204.2	212.5
Great Lakes	100.0	122.6	78.7	144.1	115.5	110.8	109.6
Tidewater	-	-	-	-	-	-	-
Truck	100.0	133.6	97.8	64.2	51.3	157.4	187.0
T.,C.& P.R.	-	-	-	-	-	-	-
<u>South Atlantic</u>	100.0	102.2	118.3	122.1	134.0	143.6	161.7
R.R.	100.0	105.2	117.3	117.3	125.3	137.2	161.0
River	100.0	101.0	103.4	116.2	147.1	149.4	152.2
Great Lakes	-	-	-	-	-	-	-
Tidewater	100.0	109.4	103.8	101.9	98.4	96.6	103.3
Truck	100.0	74.9	161.9	184.9	208.0	219.4	225.7
T.,C.& P.R.	-	-	-	-	-	-	-
<u>East South Central</u>	100.0	92.0	103.7	112.6	115.0	122.4	137.6
R.R.	100.0	103.3	127.1	158.1	161.7	196.9	218.0
River	100.0	76.4	81.8	81.2	70.0	72.3	78.3
Great Lakes	-	-	-	-	-	-	-
Tidewater	-	-	-	-	-	-	-
Truck	100.0	112.9	112.9	92.0	82.0	84.8	114.9
T.,C.& P.R.	-	-	-	-	-	-	-
<u>Mountain</u>	100.0	107.2	161.9	193.5	237.1	263.6	405.8
R.R.	100.0	85.0	154.3	131.9	147.0	198.5	230.7
River	-	-	-	-	-	-	-
Great Lakes	-	-	-	-	-	-	-
Tidewater	-	-	-	-	-	-	-
Truck	100.0	180.5	187.1	396.7	534.7	478.4	984.7
T.,C.& P.R.	-	-	-	-	-	-	-
<u>Total Coal Competitive</u>							
<u>Regions</u>	100.0	94.1	104.4	108.5	110.4	120.2	130.6
All-rail	100.0	92.2	102.5	107.1	111.2	124.5	136.6
River & ex-river	100.0	94.5	103.5	110.6	117.1	123.6	125.1
Great Lakes	100.0	88.4	103.9	100.4	89.0	100.5	109.7
Tidewater	100.0	95.5	94.2	94.3	93.1	87.7	104.9
Truck	-	-	-	-	-	-	-
T.,C.& P.R.	-	-	-	-	-	-	-

Source: Bituminous Coal and Lignite Distribution, Branch of Coal Economics, Division of Coal, Bureau of Mines, U. S. Department of the Interior.

A breakdown of regional receipts by mode of transportation highlights the seven-year changes which have taken place in the distribution landscape.

ALL-RAIL MOVEMENTS

<u>Region</u>	<u>Percent of Total Utility Movement</u>		<u>Percent Change over 1957</u>	
	<u>1957</u>	<u>1963</u>	<u>Increase</u>	<u>Decrease</u>
New England	2.2	2.4	51.2	-
Middle Atlantic	17.8	17.3	32.6	-
East North Central	38.1	25.9	-	7.2
West North Central	6.8	7.1	42.6	-
South Atlantic	21.2	25.0	61.0	-
East South Central	12.4	19.8	118.0	-
Mountain	1.5	2.5	130.7	-
TOTAL	100.0	100.0	36.6	-

The only decrease in utility tonnage was in the East North Central Region which saw this business drop 7.2 percent and slip from 38.1 percent to 25.9 percent of all utility shipments in coal-competitive regions. As will be shown below, utility volume in this region has shifted from rail to water.

The largest increase in volume in an important area was in the East South Central states, which saw a rise of 130.7 percent, with participation in the total rising from 12.4 percent in 1957 to 19.8 percent by 1963. A healthy increase also took place in the South Atlantic Region. Both of these areas have benefitted from volume rates and trainload movements, especially adapted to utility coal movement.

RIVER AND EX-RIVER MOVEMENTS

<u>Region</u>	<u>Percent of Total Utility Movement</u>		<u>Percent Change over 1957</u>	
	<u>1957</u>	<u>1963</u>	<u>Increase</u>	<u>Decrease</u>
Middle Atlantic	5.4	4.9	14.2	-
East North Central	51.2	58.0	42.9	-
West North Central	4.8	8.0	112.5	-
South Atlantic	8.6	10.5	52.5	-
East South Central	30.0	18.6	-	21.7
TOTAL	100.0	100.0	26.1	-

These river and ex-river figures for utility coal show two significant though opposite trends. River movements in the East North Central Region were up 42.9 percent, with the region's participation in total utility shipments up from 51.2 percent to 58.0 percent. This is the area (Ohio, Indiana, Illinois, Wisconsin and Michigan) where the barging of utility coal has grown rapidly to facilitate the meeting of gas competition. Increased use of rail, though several contracts have already been consummated for volume movement in unitized trains, will not show up yet in recent or current figures.

On the other hand, movements by rail in the East South Central Region (Kentucky, Tennessee, Alabama and Mississippi) have increased at the expense of water, which has declined 21.7 percent and even more significantly now is responsible for only 18.6 percent of total movement, compared to 30.0 percent in 1957. Again, this movement is of utility coal and the railroads, both in service and cost, have worked with the shippers and receivers to make possible a low delivered price.

Only three regions have any Great Lakes coal movements, as set forth in the following tabulation:

GREAT LAKES MOVEMENTS

Region	Percent of Total Utility Movement		Percent Change over 1957	
	1957	1963	Increase	Decrease
Middle Atlantic	14.0	5.5	-	57.1
East North Central	81.3	89.9	21.2	-
West North Central	4.7	4.6	9.6	-
TOTAL	100.0	100.0	9.7	-

As shown above, substantial increases have taken place in rail and river movements. Much of this coal has been diverted from movement on the lakes.

While tidewater coal has slipped in the over-all picture, its importance in the movement of coal to New England has increased by 4.6 percentage points, matched by a nearly equal decrease to the Middle Atlantic area. Increased use of tidewater to New England is an important part of the efforts of the coal industry to market its product in an area where transport costs have been a barrier to entry.

TIDEWATER MOVEMENTS

Region	Percent of Total Utility Movement		Percent Change over 1957	
	1957	1963	Increase	Decrease
New England	29.6	34.2	21.2	-
Middle Atlantic	60.8	56.3	-	2.8
South Atlantic	9.6	9.5	3.3	-
TOTAL	100.0	100.0	4.9	-

Unfortunately, as true with utility movement as with total distribution truck statistics are not clear in the sense that: (1) tramway, conveyor, and private railroad data may be lumped in with truck figures, and (2) there is no apparent pattern used in assembling such information.

Keeping in mind the possible unreliability of such data in general, these statistics, based on the same distribution data of the Bureau of Mines used throughout this report, indicate the progress of truck transportation of coal over the seven years.

TRUCK MOVEMENTS 1/

Region	Percent of Total Utility Movement		Percent Change over 1957	
	1957	1963	Increase	Decrease
Middle Atlantic	28.4	16.9	-	9.2
East North Central	38.2	38.3	52.5	-
West North Central	4.2	5.2	87.0	-
South Atlantic	10.4	15.4	125.7	-
East South Central	17.0	12.8	14.9	-
Mountain	1.8	11.4	884.1	-
TOTAL	100.0	100.0	95.2	-

1/ Contains movements of tramways, conveyors and private railroads - 4,269,000 tons in 1957 and 65,000 tons in 1963. Separate break-outs of truck movements are not available.

The most significant change is in the East North Central area which while increasing movement 52.5 percent maintained its percentage share of the truck volume. It is this area where rail movement decreased substantially, largely eroding to water and motor transportation.

The next, and summary tabulation, shows the changes which have taken place in the share of each region's utility market by each mode of transportation.

CHANGE IN PERCENTAGE POINTS
IN SHARE OF UTILITY COAL VOLUME,
BY REGION, BY MEANS OF SHIPMENT,
1963 vs. 1957

<u>Region</u>	<u>Rail</u>	<u>River and Ex-River</u>	<u>Great Lakes</u>	<u>Tidewater</u>	<u>Truck, etc.</u>
New England	+ 0.2	-	-	+4.6	-
Middle Atlantic	- 0.5	- 0.5	-8.5	-4.5	-11.5
East North Central	-12.2	+ 6.8	+8.6	-	+ 0.1
West North Central	+ 0.3	+ 3.2	-0.1	-	+ 1.0
South Atlantic	+ 3.8	+ 1.9	-	-0.1	+ 5.0
East South Central	+ 7.4	-11.4	-	-	- 4.2
Mountain	+ 1.0	-	-	-	+ 9.6

Rail's major gains have generally been in the south, with water's chief advances in the north. Major loser with respect to all five forms of shipment has been the Middle Atlantic area. Minor truck transport gains have been experienced in four of the regions where coal is trucked.

Any realistic comparison of the cost to the coal shipper of using the various transportation techniques is not feasible. This is brought out in our description of each mode in its coal transportation function.

Rail transportation has long been the major method of getting coal from the mines to the market. The assembly, classification, line haul and distribution of coal has been without pattern of organization, especially as between coal-carrying roads. Rate differentials exist between operators with respect to sources and markets. However, this is not the place to be specific and to go into detail.

The one exception to date has been the transportation of utility coal. In order to permit the delivery of coal at the lowest price (cents per million b.t.u.'s) to meet competition from gas and oil, and undoubtedly in the future from nuclear power, two steps have been taken by coal producers, railroads, and utilities in cooperation, though of course, primarily by the first two: (1) guaranteed volume, and (2) unit train operations.

First to develop were guaranteed volumes, where the railroads would allow lower rates for a guaranteed annual tonnage. The utility would then take the tonnage, if the delivered price would be right.

This type of transportation has not gained the attention or the imagination of the public as has the "unitized train." Starting early in 1953, this type of rail movement offers low train-load rates for coal assembled from a very limited number

of origins (mines) to one or two utility destinations. Rate reductions hinge on a number of considerations. A cut of from one-fourth to one-third represents the general range. The term "integral train" is sometimes used to describe this operation. No such train exists, except perhaps on the drawing boards. With such a train, equipment is special and the train exists as a unit not to be broken up. A typical movement, for example, as provided in one tariff, is three days from Western Pennsylvania to the New York-New Jersey industrial (utility) complex, heavy penalties for delay in unloading and a return trip in another three days. The true integral train is some time off. However, meanwhile the unitized train is helping the coal industry stem and in many instances reverse the erosion of its markets.

Water transportation has been instrumental in delivering low cost coal to utilities and industries on or near waterways. Statistics, other than those developed above, are scarce, especially with respect to cost. A relatively large volume of this traffic is classifiable as private transportation. This has been very effective in maintaining coal competitive in the Ohio-Mississippi system, as well as other river complexes.

In the years ahead, water transportation, especially on inland waterways, will be an increasingly effective weapon in coal's competition with gas and oil.

Truck transportation, the third of the standard modes, does not lend itself to cost or operating analysis. Again, this is a private operation, even more than water carriers. There is no common carrier movement of coal. With few or no detailed reports to be made to government, either federal or state, average length of haul, rates, volume, etc. are open to question. The only national figures are those reported to the Bureau of Mines, showing such information as has been set forth previously.

The role of truck transportation in the coal markets of 1970 and beyond cannot be assessed from this point.

The Coal Pipeline. Before concluding this paper, reference should be made to the coal pipeline. From its origin in 1957 to transport coal from Consolidation Coal Company's Georgetown mine at Cadiz, Ohio some 105 miles to the Cleveland Electric Illuminating Company's Eastlake Plant, the pipeline excited imagination. Operating costs have not been made public. The Ohio pipeline was deactivated in the fall of 1963, after having been operated for an estimated 700 million ton miles of coal, because railroad rates on the same coal were substantially reduced. It has been effectively demonstrated that this method of transportation is entirely feasible technically.

Tentative plans have been made, in one instance progressing to a point where attempts were made through the action of state legislatures to obtain eminent domain rights, to provide coal pipelines (1) from West Virginia to the New York-New Jersey industrial area, (2) from southern Illinois to Chicago, and (3) to the West Coast (California) from Utah and surrounding areas. However, until coal pipelines can secure eminent domain in interstate operations, a right now possessed by competing fuels, expansion of the pipeline will be seriously handicapped.

There are many facets of coal transportation which we have not tapped, such as comparative costs as between transport modes and with respect to coal and competing fuels. To be reasonably adequate, in the case of coal such costs would have to be constructed rather than obtained from official records. Such data would not serve our purpose.

The transportation future for coal is a bright one. This is very favorable, as chief future reductions in the delivered price of coal will have to come from distribution rather than production.

MER/fm