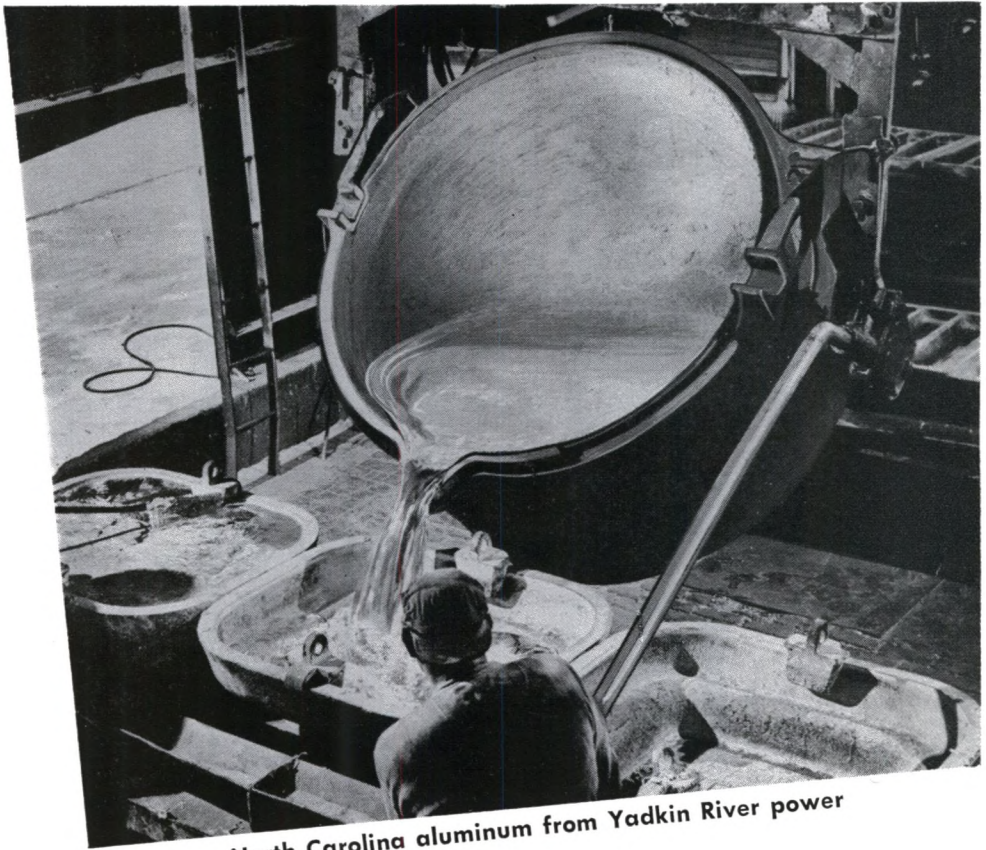


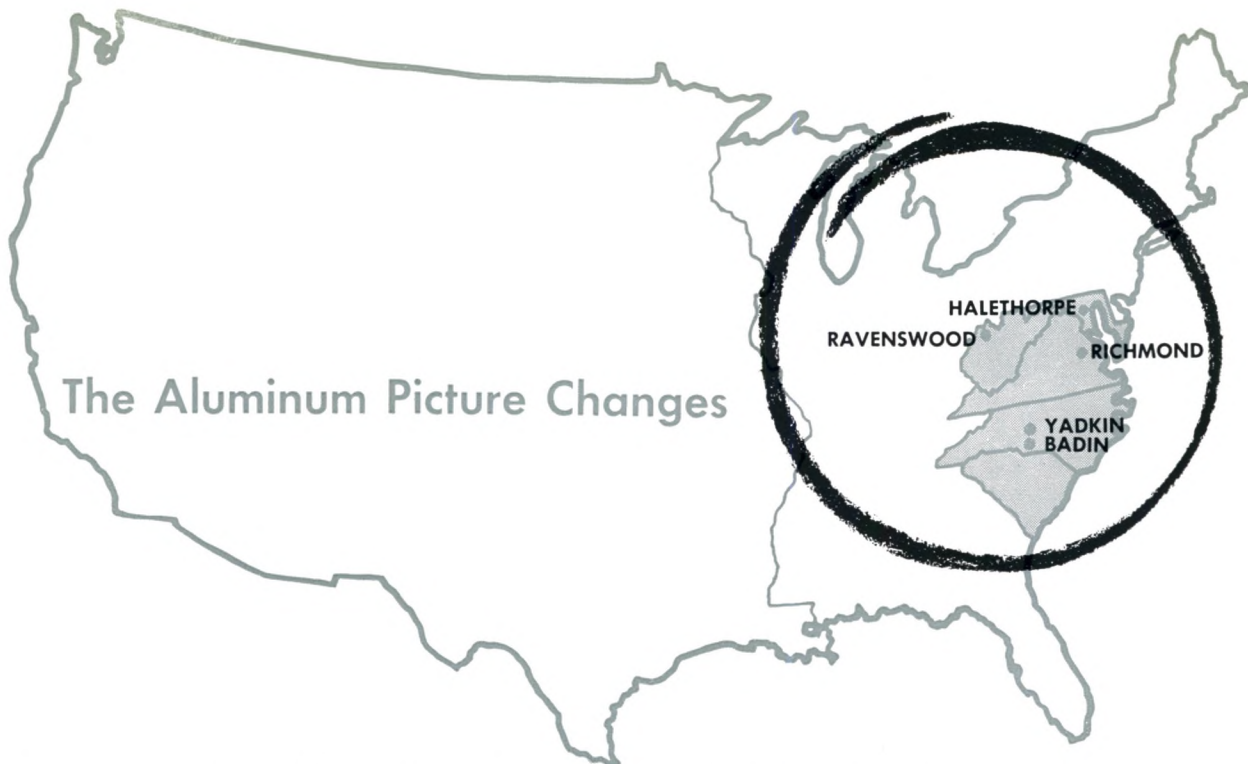
# MONTHLY REVIEW



North Carolina aluminum from Yadkin River power

FEDERAL RESERVE BANK OF RICHMOND

APRIL 1958



Ravenswood, West Virginia is giving this region a larger stake in one of the country's major growth industries. It is the site of the first of three large aluminum facilities to be built in the Ohio River Valley. When Kaiser Aluminum and Chemical Corporation completes its Ravenswood Works near the end of 1960, this plant, along with the Aluminum Company of America's Badin, North Carolina, facility, will give the Fifth District more than 10% of the primary aluminum production capacity in the United States.

The bulk of the aluminum market is located in the eastern third of the country, with 70% in the circle shown on the map above. The aluminum industry is expanding at the heart of this traditional market area.

**ALUMINUM MAKING** Primary aluminum is made from bauxite and accounts for approximately 80% of total aluminum produced in this country. The remainder, secondary aluminum, is recovered from scrap and reworked into new forms.

The processing of primary aluminum involves three stages: production of refined aluminum oxide—called alumina—from the bauxite ore, electrolytic reduction of alumina to metallic aluminum, and initial fabrication of aluminum into sheets, tubing, rods, wire and such. At the present time, all the refining of alumina is done in Arkansas, near the only domestic bauxite deposits of any value, and at Gulf Coast plants located near ports of entry for bauxite from South America and Jamaica.

In the reduction process a large and continuous supply of electricity is needed. Typically a reduction plant consists of one or more lines of electrolytic cells or potlines. To start the process, cryolite is placed into the pot, becoming a liquid when electricity is introduced. Aluminum is added and dissolved in the molten cryolite. A powerful electric current is then passed through the solution, the aluminum and oxygen separate, and pure aluminum settles to the bottom of the pot. The molten metal is tapped about every 24 hours and cast into pigs.

**NO NEWCOMER TO REGION** Alcoa's reduction plant at Badin has been in operation since World War I. The plant consists of seven potlines that are small by current standards, a carbon plant to supply material needed in the smelting process, machine shops and office buildings. Employing about 1,000 persons at the beginning of 1957, it has an annual capacity of 47,150 tons of primary aluminum. Electricity for the Badin plant comes from Alcoa's own powerhouses on the Yadkin River at High Rock, The Falls, and The Narrows.

A Federal Power Commission examiner has recently recommended that a new 50-year license be granted to Alcoa for the Yadkin project. Should this be done, the company plans to build a new hydroelectric dam at Tuckertown to increase the power supply for the Badin plant. The plant itself would be modernized and expanded, involving a total expenditure of \$38 million and adding 23,000 tons of smelting capacity.

Kaiser's Ravenswood Works consists of a reduction plant and rolling mill located on a 3,000-acre Ohio River site. It will ultimately represent an investment in excess of \$200 million. Part of the reduction plant has been in operation since November 1957 and is currently producing about 5,000 tons of primary metal monthly. The four potlines planned will when completed add 145,000 tons to annual aluminum capacity. This facility is to be expanded to an annual capacity of 220,000 tons.

As soon as dock facilities are installed, alumina from the Louisiana plants will be barged up the Mississippi and Ohio Rivers to Ravenswood. After reduction, the molten metal is drawn into 8,000-pound crucibles and carried directly to the adjacent rolling mill, where the aluminum is poured into metal casting furnaces, alloyed and cast into rolling ingots. This will eliminate the usual remelting of pigs for alloying and ingot casting.

Initial fabricating operations started in January 1957, when the capacity was approximately 2,500 tons of sheet and foil per month. A major portion of the rolling mill will be completed in the next few months, and capacity will jump to about 14,000 tons monthly. Power for Ravenswood will be generated from coal by the Ohio Power Company under a 40-year contract providing for the availability of 450,000 kilowatts.

There are presently 1,500 permanent workers at Ravenswood. The number is scheduled to climb to 3,000 by year end and ultimately to 4,500 or more. Construction workers number 7,000.

In addition to its new rolling mill, Kaiser also fabricates aluminum products at its extrusion plant at Halethorpe, Maryland. Extruding is a process whereby complicated shapes are produced by forcing hot metal through a die or form of the

desired shape. The Halethorpe plant, which employs about 700, was leased from the Government in May 1951. Its original equipment consisted of four smaller presses; a 1957 expansion program added four presses. Present capacity of this light press plant, including tubing production, is 23,000 tons annually. In addition to its own presses, Kaiser operates two 8,000-ton heavy presses for the U. S. Air Force. These have an annual capacity of 9,000 tons, bringing total Halethorpe capacity to 32,000 tons.

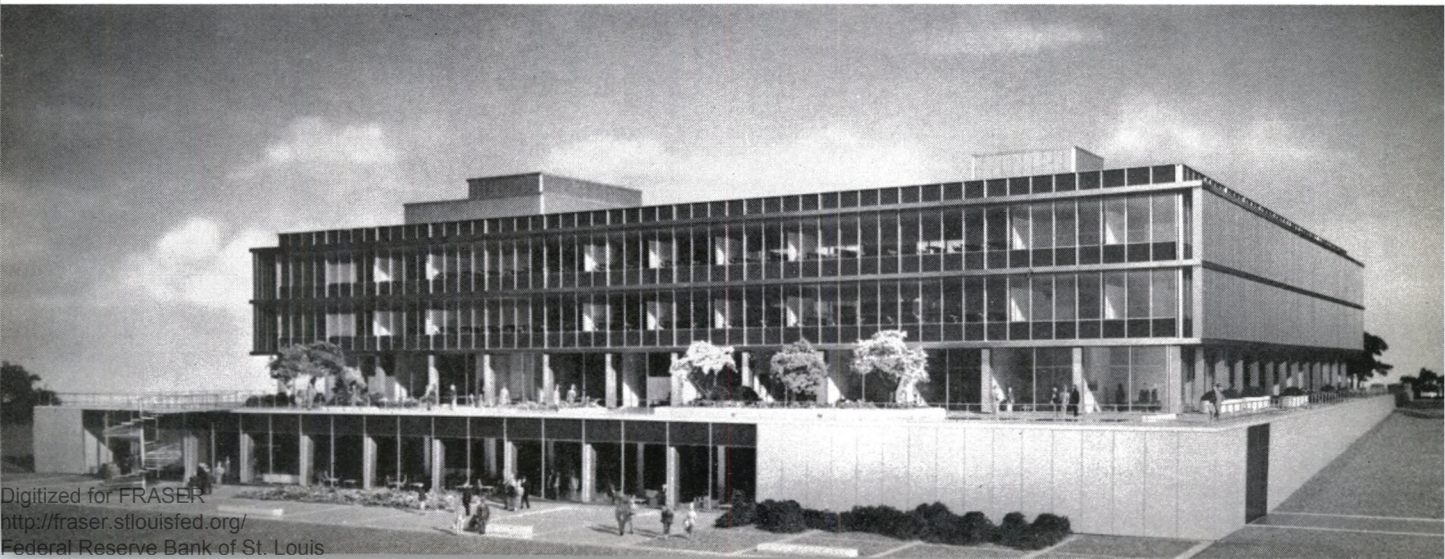
Another of the major aluminum producers operating in the District is the Reynolds Metals Company. Its executive offices, research laboratories, and five fabricating plants employ 2,300 people in Richmond, and this will be increased by 350 people this spring when the Reynolds sales force moves to Richmond from Louisville.

The oldest facility in the area is the South Plant where a variety of foils and foil products have been manufactured since 1930. Two of Reynolds' other Richmond plants also produce foil wrap and packaging containers. One-half the firm's household aluminum wrap is made and packaged at Richmond, and in the near future three more huge seven-color printing presses will be added to the one now used for printing foil-covered cartons, overwraps, and labels.

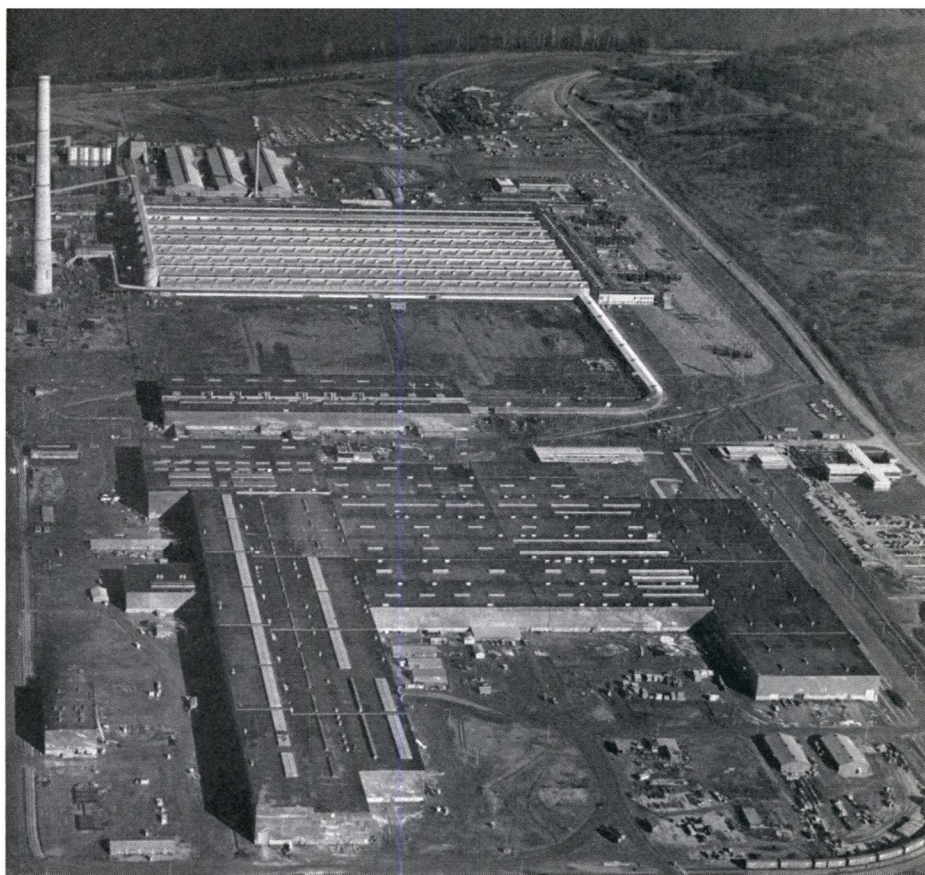
Another type of fabricating is carried out in Reynolds' Richmond extrusion plant, which was opened last July. Using pig aluminum and scrap recovered from the company's other operation, it has four presses with a 12,000-ton annual capacity.

An unusual product of the Richmond plants is aluminum yarn, produced by laminating a transparent film to aluminum foil with a color adhesive. It is slit into narrow widths and interwoven with

**This modern office building—made of aluminum, naturally—houses the executive offices of the Reynolds Metals Company.**



When completed, the Ravenswood Works will form one of the nation's largest aluminum reduction and rolling operations.



other materials. An aluminum yarn in staple form is a recent development. It is a short-length crimped fiber which can be blended with other fibers before spinning.

**INDUSTRY GROWTH** Commercial production of aluminum was started by The Pittsburgh Reduction Company in 1888. The name was changed in 1907 to the Aluminum Company of America, which remained the sole producer of aluminum in this country until 1941, when Reynolds entered the field. Kaiser started production in 1946. These three companies still dominate the aluminum industry, Alcoa, accounting for about 45% of primary capacity in 1956, Reynolds about 28%, Kaiser about 24%, and Anaconda Aluminum Co., the other operating primary producer, for 3%.

The growth of the aluminum industry has been extraordinary, developing in one person's lifetime to a leading role among metals. It was not until World War II, however, that the industry began to achieve the massive size it has gained today. World War II created such great demands for aluminum that the Government took early steps to control the existing supply and in 1941 sponsored the expansion of productive capacity. Thus primary production had grown from 164,000 tons in 1939 to 920,200 tons in 1943—23 times greater than 1915's.

Production dropped drastically after the war and concern was expressed over finding peacetime uses for the available capacity. By 1952, however, production and consumption had both exceeded the peak 1943 levels. Growth in fields other than defense has accounted for the high consumption levels in recent years. Estimated consumption in 1957 was 1,950,000 tons and it is expected to be  $3\frac{1}{2}$  times that amount by 1975.

**THE ROUTE TRAVELED** In the past, location of aluminum reduction plants has always been determined by the availability of large quantities of electricity. This was, and is, the case because it takes between 8 to 10 kwh of electricity for every pound of aluminum produced. Plants were built where power was cheap without regard to the distance to markets or to raw material sources.

The industry first moved from Pennsylvania to water power on the Niagara and St. Lawrence Rivers at the turn of the century. The tight power supply in New York State caused Alcoa, the lone producer in those days, to close the Niagara plant. When World War I required greater capacity, facilities were built in the south to use hydro power from the Little Tennessee and Yadkin Rivers.

World War II caused the industry to move westward to public dam developments in Washing-

ton and Oregon, one of the few places in the country that had surplus electric power. The share of total primary aluminum produced in the Pacific Northwest increased almost every year after 1940 and in 1949 was 52%. Since then, the amount of aluminum produced in this area has declined.

When the Korean War caused further expansion of capacity and the Pacific Northwest could no longer supply the power needed, the industry moved southwest to use natural gas as a source of power. Another fuel was found in Texas: lignite, a low-grade coal.

**HOMEWARD BOUND** With the demand for aluminum still increasing, the industry is expanding again—this time largely in the Ohio River Valley, just south of Pittsburgh where the industry started. Besides the Ravenswood operation, Alcoa is building a reduction plant at Evansville,

Ohio Valley aluminum plants will use coal-generated power.

Indiana, and Ormet Corporation, the fifth concern to enter the field, at Clarington, Ohio. When these are completed, the Ohio Valley will have jumped from 0 to 22% of United States' capacity and the Pacific Northwest will have fallen from 36% to 27%. All three plants will use steam power from the Valley's abundant coal deposits.

**LOCATION ECONOMICS** Why is the industry coming to the Ohio Valley? Bauxite, the basic ore, is shipped mainly from Jamaica and Surinam to the Gulf Coast alumina plants. Alumina for Northwest reduction plants must be shipped by railroad across the country, and the aluminum then shipped back east to the market—miles traveled: at least 4,500. Alumina can be barged upriver to the Ohio Valley relatively cheaply, taking about two weeks' time. Valley plants are only one to three days from the important aluminum consumers, and the freight costs saved are tremendous.

Further, it is becoming increasingly difficult to find new economic hydroelectric sites. Advances in steamplant design and in coal mining are such that the electrical power production cost in generating plants is following a constantly downward trend. Coal, while still more expensive than water-produced power, is much more reliable, and the large United States coal fields overlap a large part of the aluminum fabricating market.

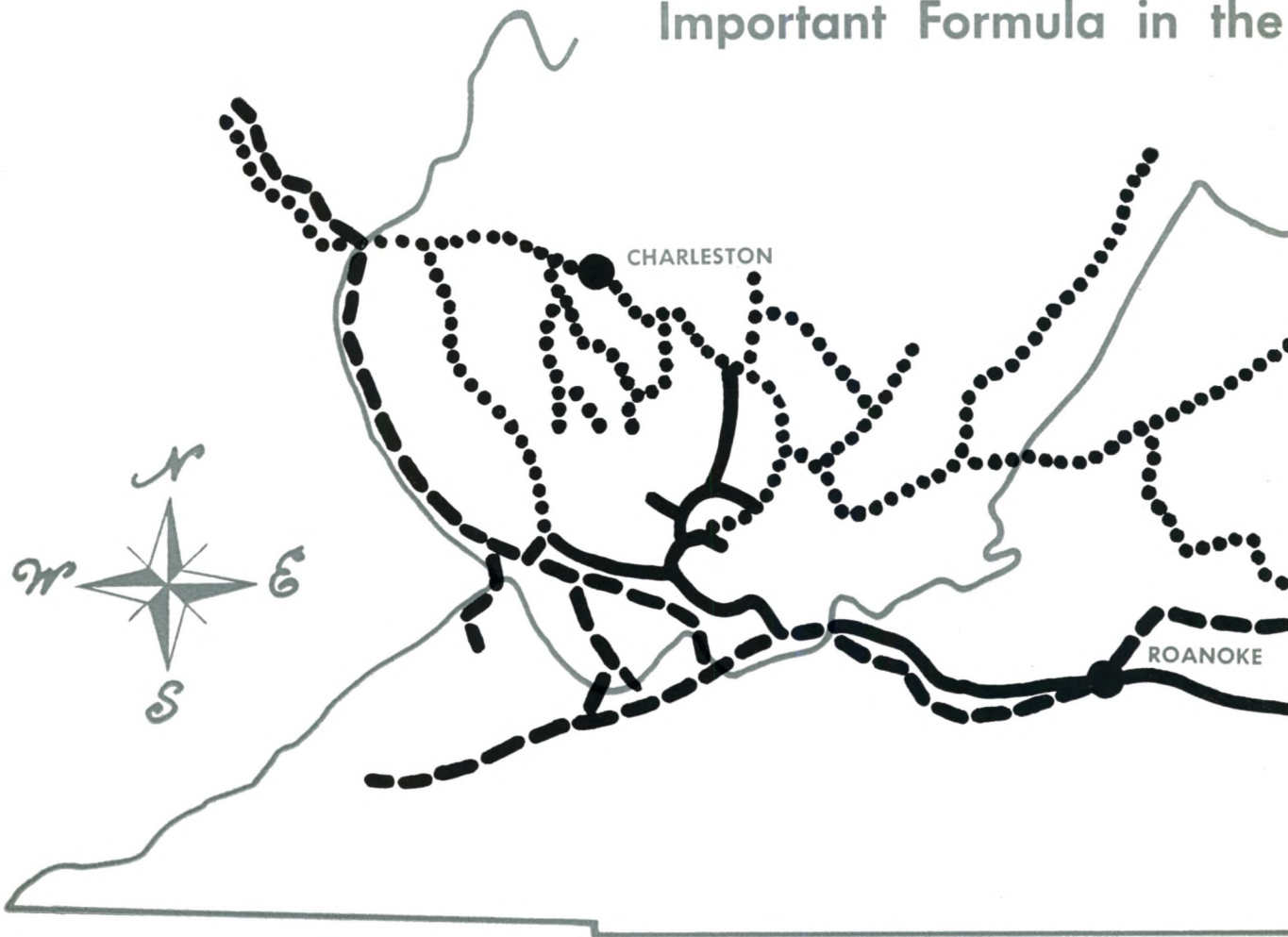
The United States Geological Survey of 1950 estimated that more than 95% of the nation's recoverable coal still lies in reserve. The aluminum industry knows that it can count on the coal supply for a long time to come.

**COAL BENEFITS** According to the U. S. Bureau of Mines, 17,000 kwh of electricity are needed to produce one ton of primary aluminum. This is equal to 6.8 tons of bituminous coal based on 0.8 lbs. of coal per kwh of electricity produced in the more efficient, modern power generating plants. In 1955, approximately 16% of total U. S. primary aluminum output was from plants using coal-based power. The figure is expected to grow to 38% by 1960, including the expanded capacity of two plants outside of the Ohio Valley. The Bureau of Mines projects that the industry will produce 5,400,000 tons of primary aluminum in 1975, and coal industry experts believe that by 1975 approximately 60% of the power consumed will be coal-based. At 6.8 tons of coal for each ton of aluminum, this means a market of more than 22 million tons of coal annually.



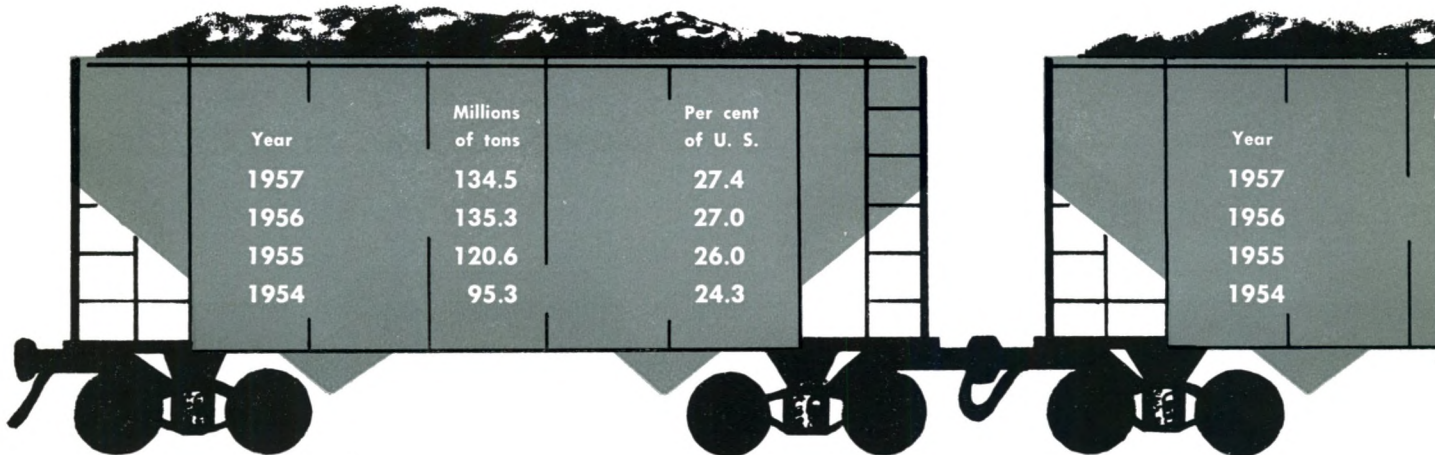
# BITUMINOUS COAL MINES + POCAHONNET

Important Formula in the



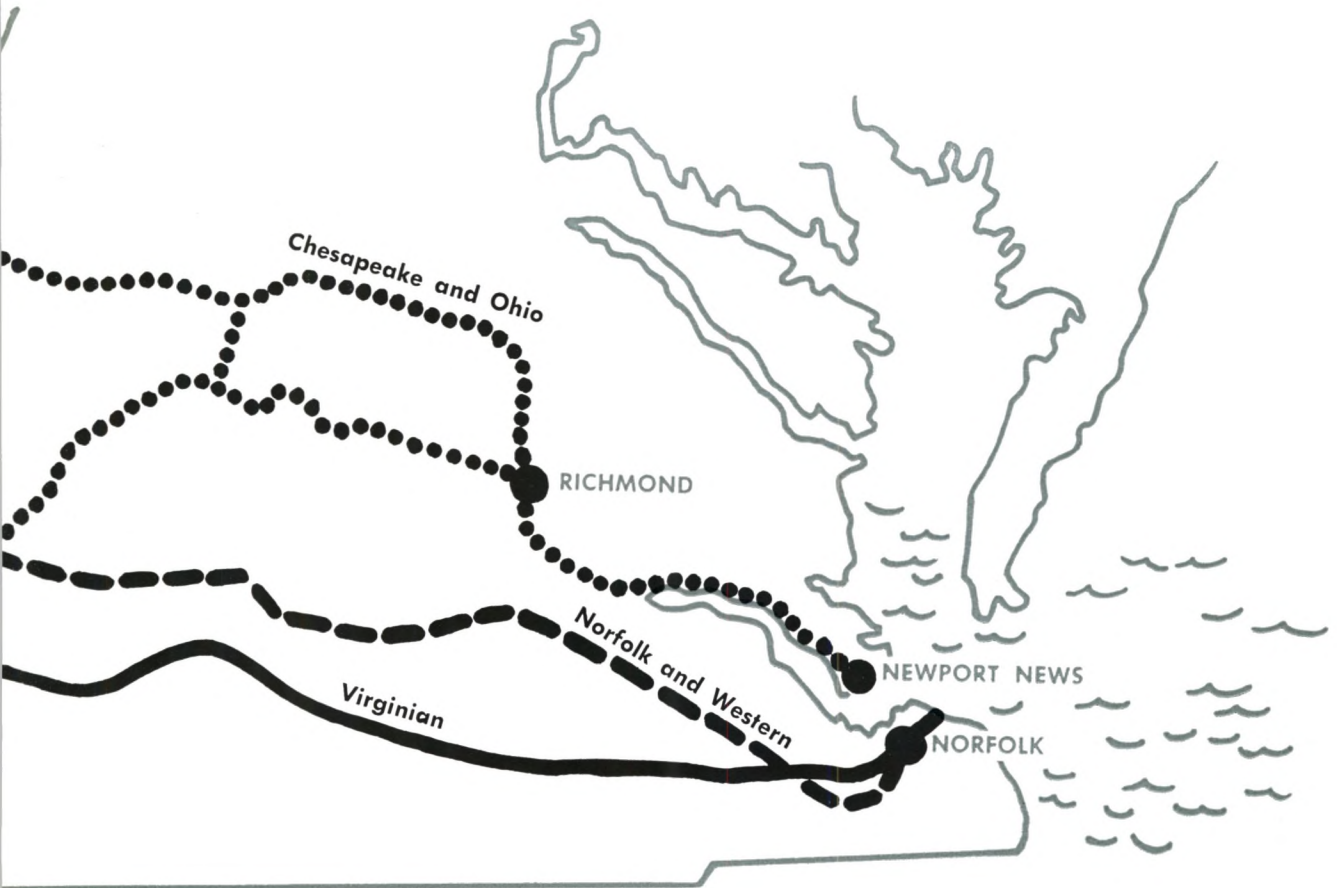
TONNAGE PRODUCED by mines in southwest Virginia and in the southern region of West Virginia

TONNAGE HANDLED by Pocahontas Railroad in these and other areas



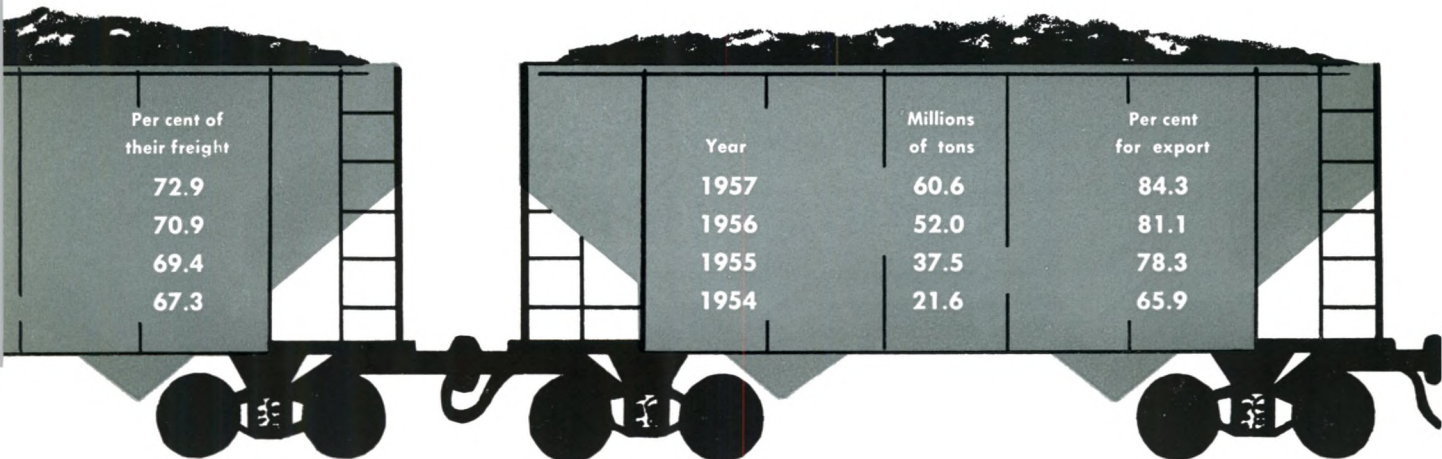
# TAS RAILROADS + HAMPTON ROADS

## 5th District's Export Trade



by the Poca-  
which serve  
coal mines

TONNAGE LOADED at the Poca-  
hontas carriers' shipping faci-  
ties in the Hampton Roads area





An \$180 million issue of revenue bonds in 1954 financed construction of this twin-tube tunnel under Baltimore harbor.



Engineering feats like this are costly. This six-mile stretch of mountain highway cost North Carolina almost \$3 million.

## State And Local Governments Borrow To Build

Not only did the nation's state and local governments borrow close to an all time record volume of long-term funds last year, but they sold their bonds in as fiercely a competitive capital market as the country has seen in many a year. Corporations were seeking more funds than they had raised the preceding year or in any other year, and mortgage indebtedness increased substantially over the year. Nevertheless, state and local governments managed to widen the range of investor interest in tax-exempt securities and tapped the long-term capital market for about a fourth more funds than in 1956.

In fact, if the \$324 million borrowed from the Federal Government is included, total long-term borrowings of states and localities last year were the greatest ever—\$7,135 million, as compared to the previous record of \$6,969 million in 1954. What a far cry this is from less than 20 years ago when state and municipal bond issues totaled only a little over \$1 billion in 1939.

**NO CHANGE IN DISTRICT** In contrast to the substantial increase of about one-fourth in long-term borrowings by the nation's state and local governments last year, there was practically no change in the Fifth District. The total of \$334 million of bonds sold by the District's 2,146 governmental units (not all have borrowing power, however) was slightly under the 1956 total. Unlike most recent years in which yearly totals were

swelled by a few unusually large individual issues, the 1957 slate of District offerings contained no "king-size" issues. The largest single loan was the \$23,550,000, Baltimore County flotation for schools, sewerage, and other public improvements. This was quite a different picture from, say, record-setting 1954 when three issues of revenue bonds alone totaled \$312 million. If the giant revenue bond issues of 1954 are excluded, the annual volume of long-term borrowing by District states and local governmental units has been quite stable over the past five years.

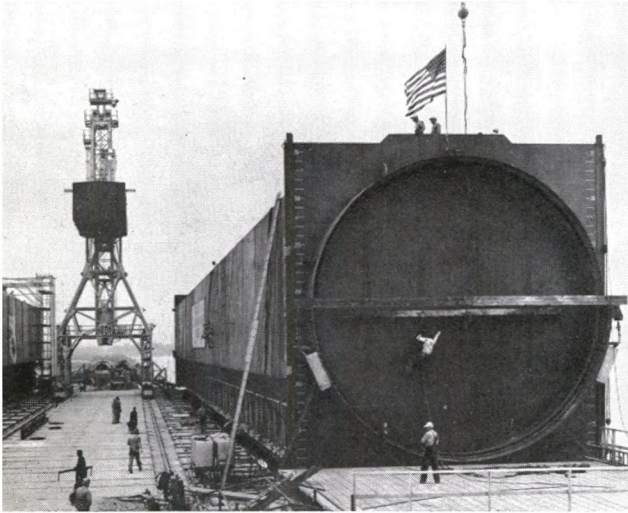
**SCHOOLS LEAD PARADE** There have been, however, considerable fluctuations in the distributions by states and by purpose of issue. The seemingly insatiable need for more educational facilities has resulted in an increasing volume of school bond issues in recent years in both the Fifth District and the nation. With the exception of one year, the share of these bonds in total annual issues has increased each year since 1952 nationally and in the District. Last year school bonds comprised 36% of total state and local issues in the nation and 41% in the Fifth District. In both areas these were the largest individual shares of total flotations.

The huge amounts borrowed last year for financing educational facilities—\$2.5 billion in the nation and \$138 million in the District—reflect the scarcity of classrooms relative to increasing



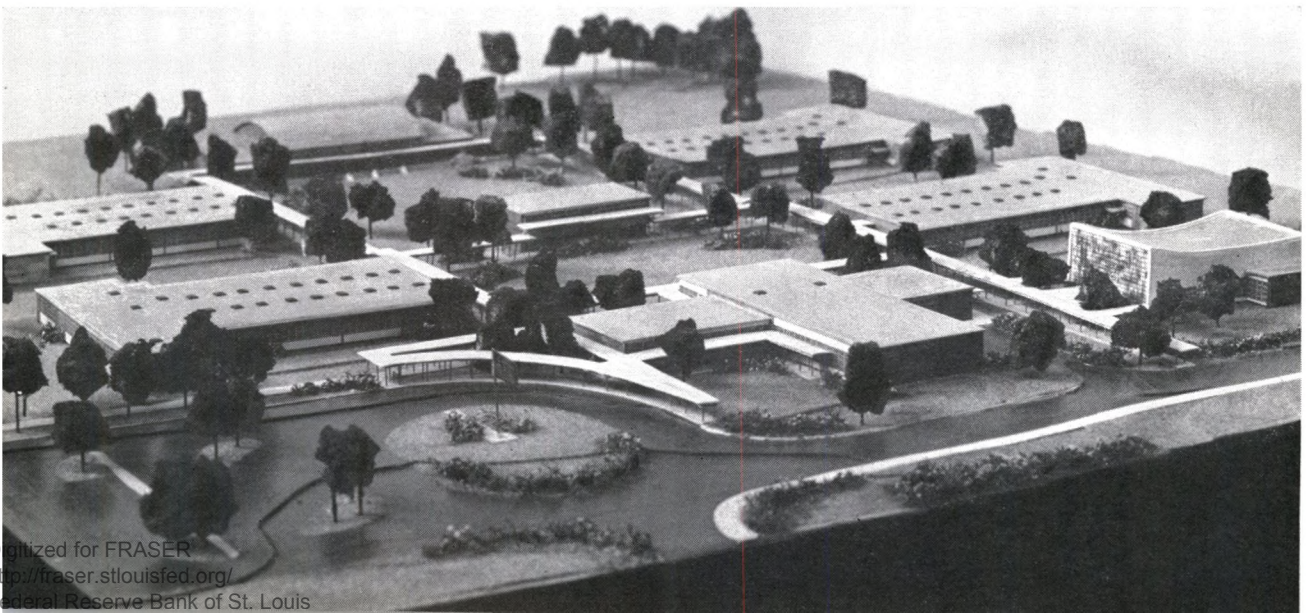


The jet-age may require much bond financing to revamp even fine airports like this one in Kanawha County, W. Va.



This is one of 23 prefabricated tubes sunk and locked in place to form a bond-financed tunnel under Hampton Roads.

(Below) No little red schoolhouse this! Modern design and construction built this junior high school in Columbia, S. C.

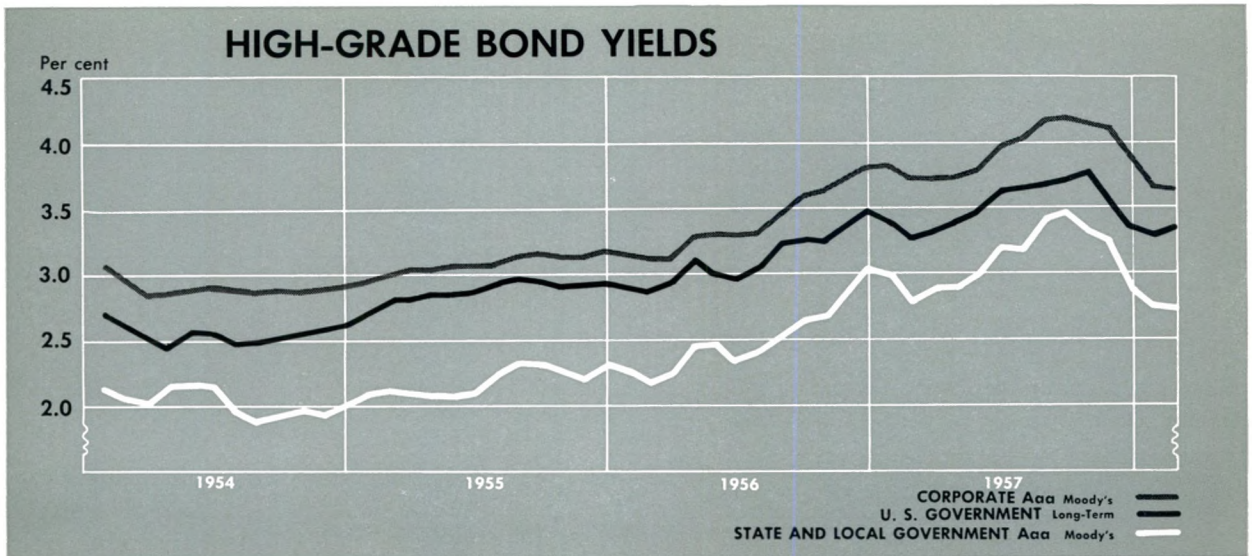


enrollments. In just the few years from 1950 to 1956, enrollments rose 31% in the nation's kindergarten and elementary schools and 28% in high schools. Estimates by the Department of Health, Education, and Welfare indicate that the growth of the school-age population is far from spent. In prospect for elementary school enrollments are a 22% gain during the last half of the present decade and a 10% rise from 1960 to 1965. High school enrollments will increase even more sharply—20% in the current period and 32% in the next five years. The rising waves of students will then hit the colleges and tax those facilities to the utmost.

Problems arising from such population developments are and will be particularly pronounced in the Fifth District. With the exception of Maryland, District states have larger proportions of their populations under 17, in preschool and compulsory school ages, than does the nation.

This all means that state, county, and municipal finance officers are likely to be hard pressed to find sufficient funds for all the school construction projects that will be scheduled. And it is easy to see that this, in turn, means further pressure for increasing tax revenues and further request for voter approval of school bond issues.

**HIGHWAY FINANCING** In this modern age—with the economy “on wheels”—highway construction and maintenance absorb a major share of public financing by bond issues. In five out of the past eight years, for example, funds borrowed by state and local governments in the District to finance road and bridge projects accounted for a larger share of total borrowings than any other single category. Last year, however, there was a



The decline in yields since last Fall on bonds already issued and outstanding was accompanied by lower rates on new loans.

sharp decline in the amount borrowed for this purpose and the \$29 million of highway bond issues comprised less than 10% of total long-term borrowings. This was far less than the average of around one-third for the preceding seven years.

In view of the immensity and urgency of the backlog of highway needs and the additional requirements of an expanding and shifting population, however, it would seem that borrowing for highway construction will continue to be a major factor of demand in the long-term capital market.

**A GROWING PROBLEM** The provision of adequate water and sewerage facilities has been a problem of increasing severity since the end of World War II. Unlike most other major categories of capital projects, this burden has fallen almost entirely on local governments. The states of the nation have a relatively small responsibility in this field and found it necessary to borrow only \$14 million last year to finance water and sewerage projects. The country's municipalities and other local governmental units, on the other hand, borrowed about one billion dollars for the same purpose. Water and sewer bonds sold by the District's state and local governments in 1957 amounted to around \$87 million.

There seems little reason to labor the contention that this category of capital expenditures will continue on relatively high levels. Backlogs of demand for water, sewer, and industrial waste facilities are increasing, not decreasing. Furthermore, such projects are usually marked by their urgency. Of course, most capital projects pro-

posed by local governments, as well as the bond issues to finance them, are essential, but some of the projects are more subject to postponement and delay than are others. A road system, for example, may be demonstrably inadequate, but voters may reject a proposed bond issue to finance new roads because it always seems possible to squeeze more use out of the existing roads even at the expense of greater traffic jams. A water or sewer system, on the other hand, generally has much less flexible limits on its capacity. The need for more water or greater sewerage disposal capacity becomes acute very shortly after the need arises. Voters are not prone to refuse approval of bond issues to finance such projects.

**DECREASE NOT INDICATED** Backlogs of needs, population increases, business growth, and continued suburbanization indicate continuation of the large annual volumes of state and local government outlays that have been made in recent years for the preceding purposes and for other types of capital projects. This in turn would seem to assure the maintenance of the important position that states and localities have come to occupy as borrowers in the long-term capital market.

So far this year, bond offerings of states and municipalities have poured out at a record rate—over \$9 billion on an annual basis in the first quarter. This heavy volume is attributable in part to the decline in the cost of borrowing in recent months, but it is also impressive evidence of the truly tremendous long-term credit needs of states and localities.

## The Fifth District

Like the weather, business activity in the Fifth District continued on the bad side during March. For the second consecutive month, foul weather took its toll of construction, transportation, production, and trade. But although snow, rain, and high winds made life miserable and adversely affected business activity, the weather was not the principal cause of the continuation of the business recession in this District and abroad in the nation. Economic, as well as physical, forces have been behind the slackening pace of business activity.

Final reports for February demonstrated clearly the broad front of the recession. With few important exceptions, the slowdown crept further and wider into the business structure of this District. Favorable developments bucking the general trend were scarce but noteworthy. The value of building permits, adjusted for seasonal influence, climbed to a height that was second only to the record high of January 1950. Man-hours in North Carolina weaving and knitting mills increased appreciably, and government employment in the District registered gains. The rise in the latter during February was less, however, than was realized in that month for several years.

The recession in the Fifth District thus far differs but little from the same period of the 1953-54 downturn. The present recession is, however, somewhat more accentuated in manufacturing and trade than was the case in the preceding period. This District has not suffered as much decline in the current recession as has the nation. The reason for this is found mainly in the fact that the greatest impact of the downturn thus far

has fallen on durable goods manufacturing industries, and these do not have the relative importance in the District that they have in the rest of the country. With respect to nondurable goods manufacturing industries and nonmanufacturing activities as a whole, the experience of the District so far has been similar to that of the nation.

Smaller proportions of the labor force were unemployed in the week ended March 1 in most of the District states than in the nation. Only West Virginia had a higher proportion than the national average.

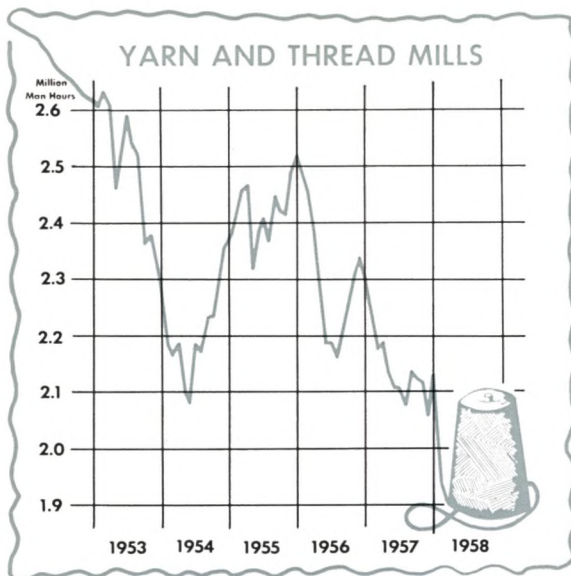
**CONSTRUCTION** The construction industry has been and continues to be one of the bright spots in the District's economy despite a reduced demand for construction workers. The latter may be a temporary decline accounted for by adverse weather.

A strong upsurge occurred in the valuation of District building permits in both January and February, and builders seemed encouraged about a continuation of the trend. The February (seasonally adjusted) level approached very closely the all-time peak month of January 1950. This is an impressive vote of confidence in the midst of receding business in general.

**TRADE** Many eyes are focused on trade these days for it is an important consideration in determining the extent and duration of the current recession. Relative strength in retail trade would hasten inventory liquidation and bring the time nearer when increased production would be required. February trade figures did not give this

Preparations for the Easter Parade did not result in the volume of orders hoped for by Fifth District textile mills.





The decline in yarn spinners' activity, in process since late 1955, has been intensified by a drop in industrial demand.

reassurance, but the indications are inconclusive because of the intervention of the extremely unfavorable weather during that month. March does not seem to be doing any better than February, but again, March has been a very rainy month in the important Eastern Seaboard, and on one occasion transportation was completely disrupted from Washington, D. C. to New England by an unseasonable snowfall.

**MANUFACTURING** The recession thus far has been largely in manufacturing and mining. February manufacturing activity, as measured by man-hours worked, dropped considerably more than seasonally both in the District and the nation from January in durable and nondurable goods industries. The relative decline from a year ago in durable goods manufacturing in the District was only about three-fourths what it was in the nation. The decline from the preceding month was about the same in the District and the nation. The percentage drop in nondurable goods manufacturing in the District was slightly more than it was in the nation in both periods.

Reduced demand at the retail level and inventory reductions by manufacturers and distributors caused sharp drops in the production of furniture, metals, transportation equipment, apparel, paper, and tobacco products. Yarn and thread mill activity in North Carolina declined, but by a smaller percentage than in February 1957. Knitting mills moved contrary to the recession, with

full-fashioned hosiery plants scoring notable production gains. The broad woven fabrics industries of North Carolina appeared, on the basis of man-hour data, to have had a contraseasonal rise in production.

**EMPLOYMENT** Although the insured unemployment figure of 241,000 at the end of February (excluding railroad) looks big, actual employment in the District has not been badly affected by the recession. In February total nonagricultural employment was 1.1% smaller than a year ago. On a percentage basis the greatest year-to-year decline has occurred in mining, followed in turn by manufacturing, transportation, and contract construction. Nearly offsetting these losses have been gains in the finance, insurance, and real estate group; and in services, government, and trade. The February decline in employment was more than seasonal in most District industries. The story for March was not available at this writing, but the latest data on unemployment showed declines in the second and third weeks of the month.

**BANKING** District business loan demand—long one of the area's soft spots—has perked up much more than seasonally the last few weeks. By the third week of March, four straight weekly gains had pushed business loans of District weekly reporting member banks up \$37 million—a performance considerably topping those of the like weeks of either 1956 or 1957. Despite this impressive record, however, business loans of weekly reporting banks on March 19 still were running below the levels at the beginning of the year.

Except for consumer loans, other categories of bank loans—security, real estate, agricultural, and loans to banks—all rallied during these same four weeks. The net result was a sharp \$57.4 million rise in total loans of weekly reporting member banks—much more than the gains chalked up these same periods of 1956 and 1957.

**PHOTO CREDITS**

- Cover—Aluminum Company of America
- 3. Reynolds Metals Co.
- 4. Kaiser Aluminum & Chemical Corp.
- 5. National Coal Association
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- 9. West Virginia Industrial and Publicity Commission - Virginia Dept. of Highways - Lafaye, Fair, Lafaye and Associates, Architects
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