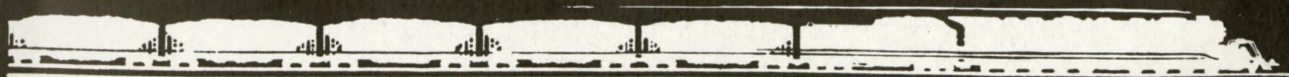


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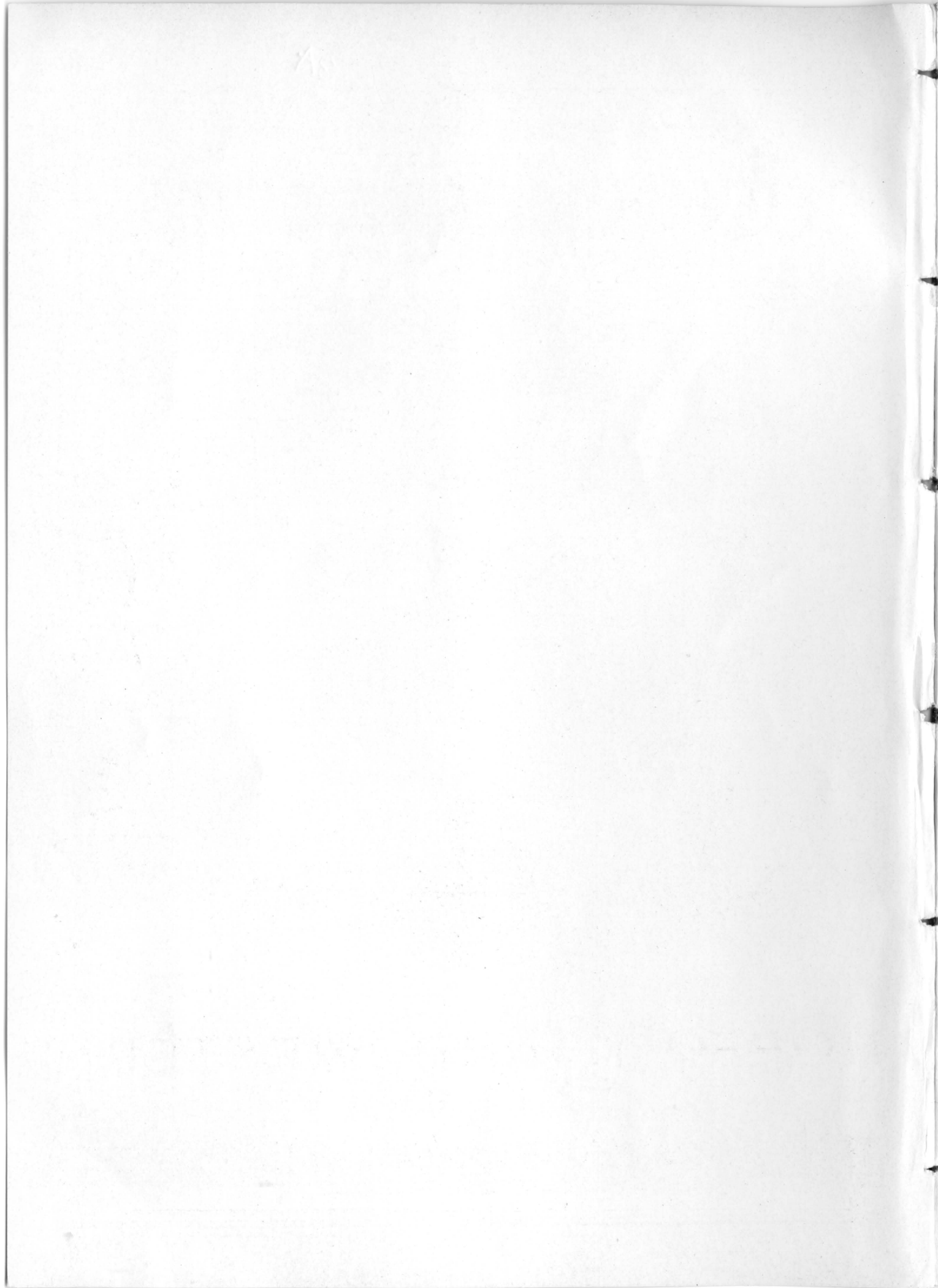
The STORY OF **FUEL SATISFACTION**



NORFOLK AND WESTERN RAILWAY



CARRIER OF FUEL SATISFACTION

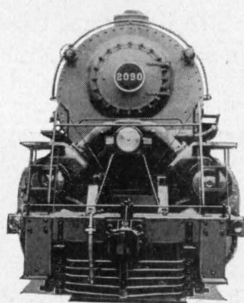


THE STORY OF FUEL SATISFACTION

FOREWORD

IT IS AN INTERESTING STORY—this one of Fuel Satisfaction—and an unusual one. Industrial history has seldom produced a similar or comparable story. Consequently, this booklet has been prepared by the Norfolk and Western Railway, not only to record a bit of economic history, but, as well, to present a few pertinent facts which it is hoped will be helpful to all who distribute or consume solid fuel.

Additional copies of this publication may be obtained from any of the Railway's Coal Bureaus, from the Coal Traffic Department, Roanoke, Va., or from any of the representatives listed on Page 32.



NORFOLK AND WESTERN RAILWAY



CARRIER OF FUEL SATISFACTION

WHAT IS FUEL SATISFACTION?

FUEL SATISFACTION is the name given by the Norfolk and Western Railway to all coal mined on its lines in southern West Virginia, southwestern Virginia and the eastern portion of Kentucky.

That is an answer to the question at the top of this page—but it is an inadequate answer without the colorful and unusual story that lies behind the term—Fuel Satisfaction. For Fuel Satisfaction is more than a name for a variety of excellent coals; it is a mark of distinction, a reward conferred upon coals that have fought for and won their right to preëminence in the field of fuel. The term is proudly and confidently used by the railroad in all references to the coals that are produced on its line.

To understand the unusual action of a railroad in so naming a product in which its only interest is transportation from mine to market, it is necessary to go back to the boom years of 1928-1929. In the latter part of 1928 the Norfolk and Western Railway reached the conclusion that the time had come to translate an intangible idea of partnership into a reality. Following this decision, A. C. Needles, President of the railroad, invited representatives of the coal industry in the carrier's territory (and their selling agents) to a conference in Roanoke, Va. In explaining the purpose of the gathering, Vice President W. J. Jenks, of the Norfolk and Western, said:

"The object of this meeting is to see if, by putting our heads together, we can find a way by which more coal from mines on the Norfolk and Western can be produced, marketed and consumed."

Out of this conference, and those that followed, there developed activities and accomplishments that have made, and are still making, industrial history. An intangible idea of partnership between the producers and sellers of coal on the one hand and the railway on the other has become tangible coöperation expressed through many mediums.

Coal Bureaus, located at strategic points throughout the country, were established by the railway and manned by fuel experts. Advertising—by the railway—appeared in trade publications, newspapers and magazines. Then came a flood of literature—produced by the railway. But these activities will be described in later chapters of this booklet; our interest now is in the term "Fuel Satisfaction".

The first problem of the railway, after it had decided to do what it could to help increase the production, sale and consumption of the coals mined on its line, was to find a term that would accurately describe these coals and about which an advertising campaign could be built. A committee met for this purpose. Agreement was quickly reached to designate the railway as a "Carrier of . . . Coal". But every member of the committee knew that the coals

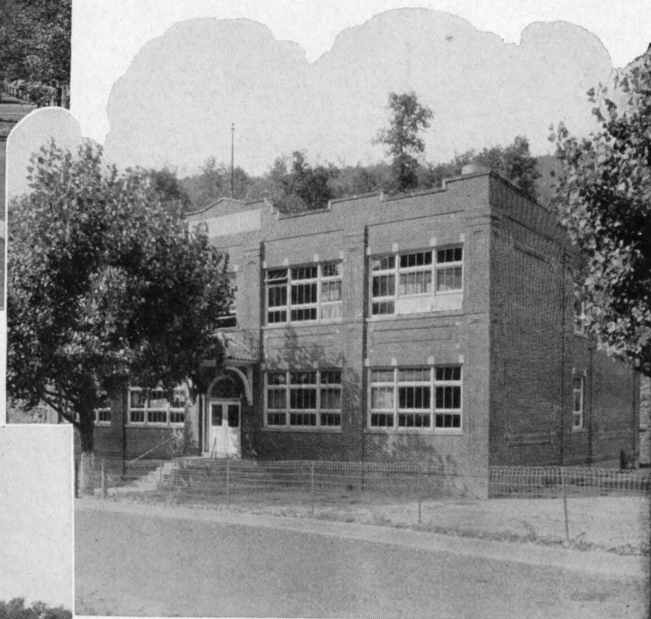


The end of a good day. Some of the men who mine Fuel Satisfaction

FOR THE MINER OF FUEL SATISFACTION



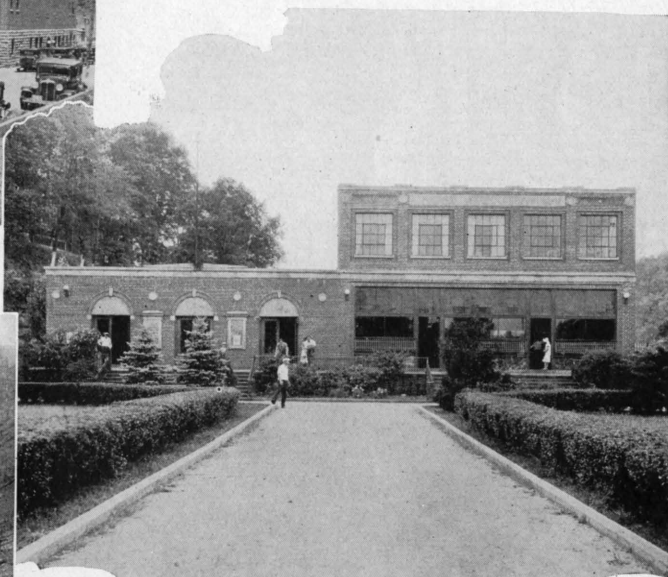
Miners' homes are comfortable and attractive



Miners' children have every educational opportunity



Theatres, stores and offices are modern



Above: Commissary stores are attractive and economical

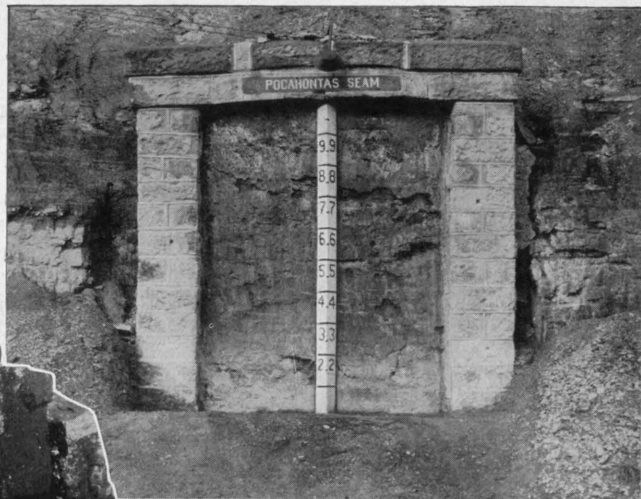


Left: A typical street scene in a mining town

INTRODUCING FUEL SATISFACTION



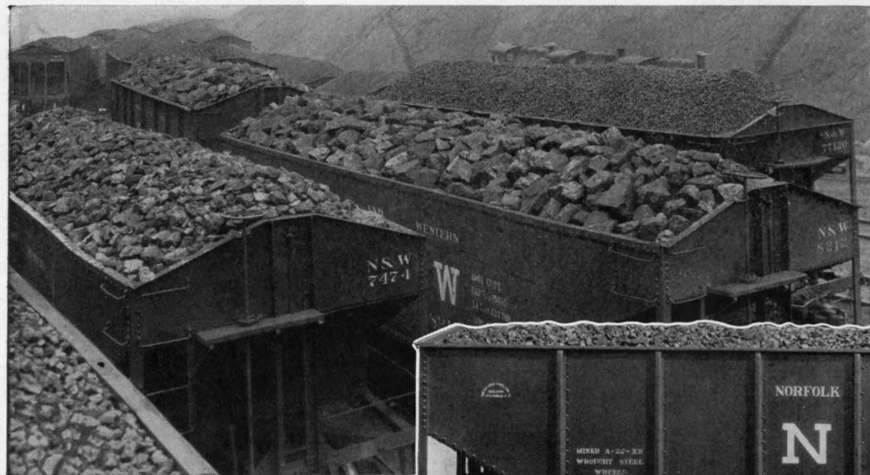
Above: High volatile Fuel Satisfaction. Note the difference in appearance from low volatile



A ten-foot outcrop of Pocahontas coal

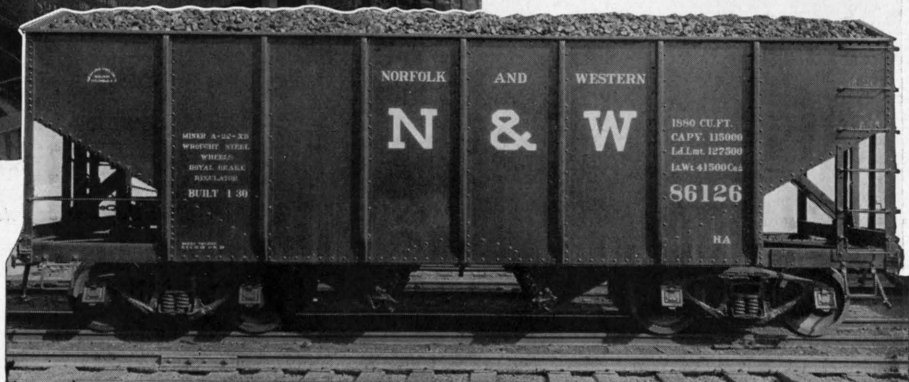


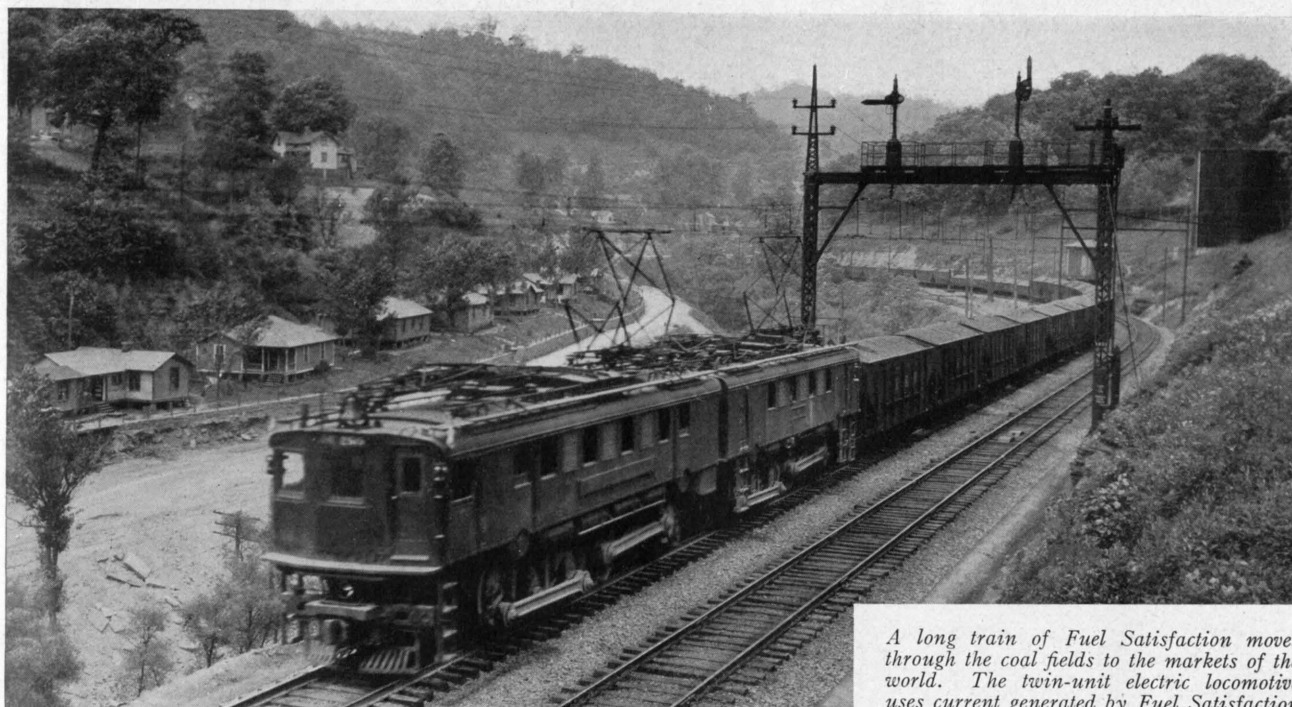
Right: Typical lumps of low volatile Fuel Satisfaction. Note the difference in appearance from high volatile



Left: Sized Fuel Satisfaction ready to move to markets

Right: A famous combination—Fuel Satisfaction and an N. & W. coal car





A long train of Fuel Satisfaction moves through the coal fields to the markets of the world. The twin-unit electric locomotive uses current generated by Fuel Satisfaction

from Norfolk and Western territory deserved a better name. They give a great measure of—satisfaction. And with that thought the slogan “Carrier of Fuel Satisfaction” was born. From that day to the present the coals mined on the Norfolk and Western have been known, insofar as the railway is concerned, as Fuel Satisfaction—not coal, but a manufactured product, ideally formed by the slow processes of nature to meet every fuel requirement, prepared for market by ultra-modern methods and delivered in any quantity at any time by an adequate, efficient transportation system.

The area in which Fuel Satisfaction is mined lies deep in the Appalachian Mountains; an area of forest-clad, high ridges and narrow, winding valleys. Fuel Satisfaction mines are located in this Mountain Empire on the main line and branches of the railway for a distance of approximately 200 miles between Bluefield, W. Va., on the east almost to the Ohio River at Kenova, W. Va., on the west, including the Clinch Valley Division of the railway as far as Norton, Va.

Included among the coals referred to in this booklet as Fuel Satisfaction are those from the famous Pocahontas and Tug River Districts of the Pocahontas Field, the Thacker and Kenova Districts of the Williamson Field, the Clinch Valley Fields and the Virginia Anthracite Field. Coal from the Pocahontas Field is a low volatile, or smokeless coal; that from the Williamson Field is high volatile coal, particularly suited for industrial and by-product uses; the Clinch Valley coals are of high, medium and low volatile composition and those from the Virginia Anthracite Field are “hard coals” as the name of the field implies.

Thus it will be seen that Fuel Satisfaction is a name given to a wide variety of coals so that *every* fuel requirement, whether it be domestic, industrial or special, can be met satisfactorily by the use of these coals. In fact, the range in the chemical composition of these coals enables the railway to sponsor the assertion that, in Fuel Satisfaction, any and every consumer of coal can find a solution to every fuel problem.

Fuel Satisfaction comes from seams that are geologically lower—which means that the coal is older; that it has been in the slow process of formation longer than the ordinary bituminous coals. The result is that nature has had time to complete its refining process and, by the forces of pressure and distillation by heat, it has created the purest of fuels.

Naturally, the demand for Fuel Satisfaction during the past fifty years has been great, yet the supply of coal in this great storehouse has been but touched. It is conservatively estimated that there are at least twenty billion tons of Fuel Satisfaction still available for mining in the territory served by the Norfolk and Western—enough coal to supply the fuel requirements of many generations.

What is Fuel Satisfaction? Coal mined along the lines of the Norfolk and Western Railway; a variety of coals to meet every fuel need; coals that have been formed by nature to meet a great range of demands; coals that have been properly mined, manufactured, cleaned, graded, sized and inspected—and moved from mine to market by a transportation service that insures an adequate supply under any and all conditions.

THE HISTORY OF FUEL SATISFACTION

WHILE THE TERM Fuel Satisfaction is but five years old, the history of the product so named goes back to the days when the world was young. Ages ago, so long ago that the estimated time becomes a huge and meaningless figure, nature spread the earth with luxuriant vegetation. The land was swampy, the atmosphere heavy with moisture, and the climate very mild. Animal life had not yet appeared. In that period were deposited the myriad layers of vegetable matter which, in the course of time, became peat and, finally, after being covered by rock-forming materials, these strata of peat were converted into coal by the slow forces of pressure and distillation by heat.

In the territory now served by the Norfolk and Western Railway, conditions were particularly favorable for the formation of excellent coals and, in the course of time, nature completed the making and burying of vast areas of quality coal in the Appalachian highlands.

Before the Revolutionary War the lands on the eastern slope of the Appalachian Mountains were reputed to be coal-bearing, being so described in grants from the British Crown as early as 1750. It was not until 1881, however, that F. J. Kimball, then Vice President of the Norfolk and Western Railway (later its president), ignoring the reports of several geologists, led an exploring party into the heavily wooded mountains of southwestern Virginia and

discovered the object of his search—the famous Pocahontas No. 3 seam of coal which is twelve feet thick at the point of discovery.

Immediately after the attention of the world was directed to this new and great reservoir of heat and power, the railway began building a line from New River, Va., westward to the new coal field and the first carload of Fuel Satisfaction was loaded and shipped on March 12, 1883. The line was formally opened on May 21, 1883, and in the following month Fuel Satisfaction began moving eastward to tide-water at Norfolk, Va. With the completion of a line from the coal fields westward to the Ohio River in 1889, Fuel Satisfaction began to move to all of the great fuel-consuming markets of the world. And it has continued to so move, in an ever-increasing volume, since that time.

Pioneer railroad men and coal operators conquered an almost impenetrable mountain wilderness to build this "Empire of Fuel Satisfaction." Furthermore, their successors have kept pace with mining and transportation progress in order to offer the world the best in both services. The railway is electrified throughout its mountain divisions; its equipment is maintained to the highest of modern standards. Coal-mining plants are uniformly ahead of general progress in mining and mechanical preparation equipment. As a result, today the consumer of Fuel Satisfaction is assured of an adequate supply of excellent coals, properly mined, carefully prepared and efficiently delivered.



*Thirty-seven years ago the pioneers who developed the great Pocahontas Coal Field assembled for this photograph—
taken at Bottom Creek, W. Va., in 1896*

IN THE EARLY DAYS

*Below: A wooden coal car
of bygone days*



*One of the first coal tipples in
the Pocahontas Field, span-
ning the railway's main line
near Coaldale*

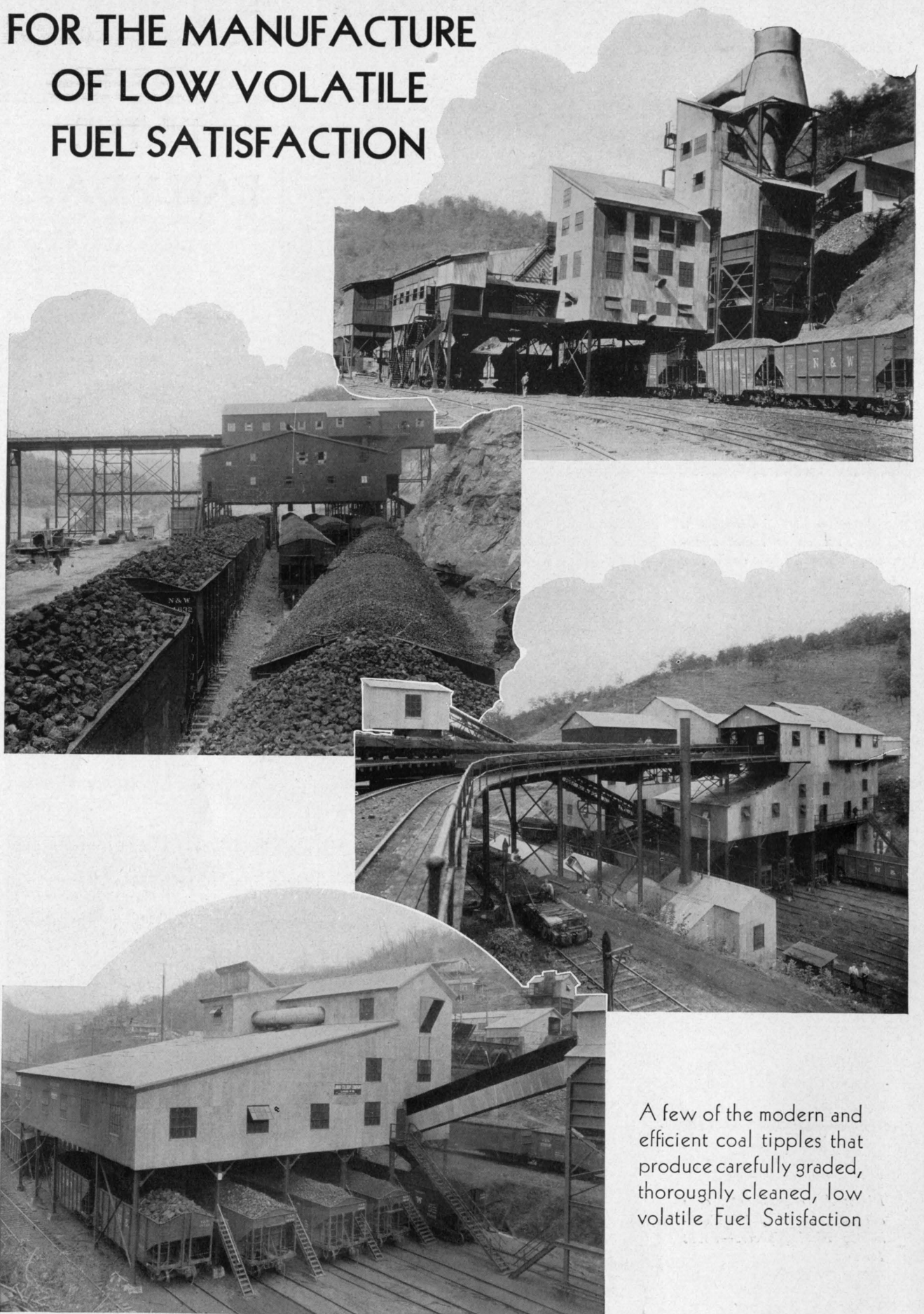


*Above: The first coal piers at
Lambert Point (Norfolk), Va.*

*Right: An experimental coke
oven and some of the Poca-
hontas Field pioneers—about
1884*



FOR THE MANUFACTURE OF LOW VOLATILE FUEL SATISFACTION



A few of the modern and efficient coal tipples that produce carefully graded, thoroughly cleaned, low volatile Fuel Satisfaction

LOW VOLATILE FUEL SATISFACTION

WHILE THE AVERAGE coal consumer may not be interested in the chemical composition of the fuel he purchases, he *is* interested in its efficiency, in the volume of smoke created by combustion, in the residue or ash left after combustion, in its size and freedom from foreign matter and in its effect upon his heating plant. Consequently, consideration must be given to several elements that enter into the "satisfaction" that any fuel can give.

The heating qualities of coal are contained in the amount of "fixed carbon" and "volatile matter" therein, the latter element determining to a certain extent the amount of smoke that is created by combustion in the average hand-fired plant. The moisture and ash content of coal is waste insofar as heat is concerned. Sulphur in coal is not only a waste but a corrosive element that ruins heating plants.

Consider these facts in connection with "Low Volatile Fuel Satisfaction." As its name implies it is low in volatile matter, therefore smokeless, and high in fixed carbon, thus insuring top rank in heating values. The moisture and ash content is extremely low so that waste in combustion is negligible. The sulphur content is small. Fuel Satisfaction is sized, cleaned and inspected in modern manufacturing plants.

These excellent coals are mined in a compact area

in Mercer and McDowell Counties, W. Va., and in Taxewell County, Va., a section generally known as the Pocahontas Coal Field. The seams mined, named in order of their importance (measured by the tonnage produced), are Pocahontas No. 3, Pocahontas No. 4, War Creek or Beckley, Pocahontas No. 5, Jewel, Bradshaw, Sewell, Welch and others. The seams range in thickness from 3 to 12 feet.

It is to be expected that coals of such remarkable purity and high heat content would have many uses and a wide distribution. They are standard for marine use; they hold high rank as steam producers; they are in great demand for domestic use, their smokeless character and low ash content making them especially desirable for this purpose. They are especially adapted for mixture with high volatile coals in by-product use and a large tonnage is shipped for this purpose.

A striking testimonial to the excellence of these smokeless coals is found in the large use of them by the steel industry, by-product plants and other large fuel consumers after searching investigation and comparison with other sources of supply. Still another testimonial of their excellence is found in the constantly increasing demand for these coals by domestic consumers and building owners for use in both hand-fired and automatic stoker-fired plants.



A modern Fuel Satisfaction manufacturing plant—otherwise known as a coal tippie—in the famous Pocahontas Field

HIGH VOLATILE FUEL SATISFACTION

THE PRINCIPAL DIFFERENCE between low volatile and high volatile Fuel Satisfaction lies, not in heating values, but in the proportions of volatile matter and fixed carbon therein. The moisture, ash and sulphur content of high volatile Fuel Satisfaction (the undesirable elements of coal) is—as in the case of low volatile Fuel Satisfaction—very low. The heating values (measured in British thermal units—the amount of heat that is required to raise the temperature of one pound of water one degree Fahrenheit) are correspondingly high. Whatever can be said in favor of low volatile Fuel Satisfaction can therefore be applied equally well to the high volatile product, with the single exception of the amount of volatile content.

These high volatile coals may truly be described as “all-purpose fuels”. They are ideally suited for by-product use and large by-product interests have extensive holdings in these districts. Furthermore, the excellence of these coals is well recognized for steam and domestic purposes, for cement manufacture, for brick and ceramic burning, for manufacturing producer and water gas and for metallurgical use.

Practically all of the high (and medium) volatile bituminous coals along the Norfolk and Western are mined in the Williamson Field, lying in Mingo and Wayne Counties, W. Va., Buchanan County, Va., in

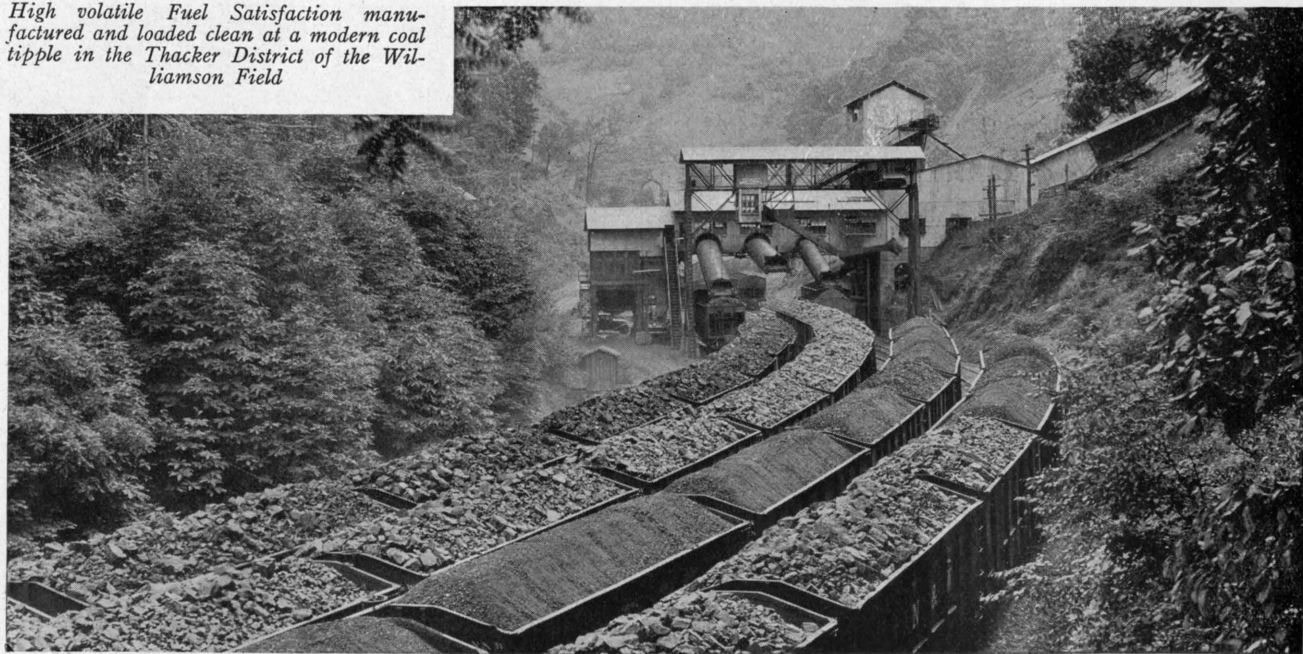
Pike and Martin Counties, Ky., and in the Clinch Valley Field which lies in Tazewell, Russell and Wise Counties, Va. Named in order of their importance, as measured by production, the seams mined are No. 2 Gas (Pond Creek, Freeburn, Warfield), Cedar Grove (Thacker, Red Jacket), Winifrede, Upper and Lower Banner, Raven Red Ash, Eagle, Alma, Clintwood and others.

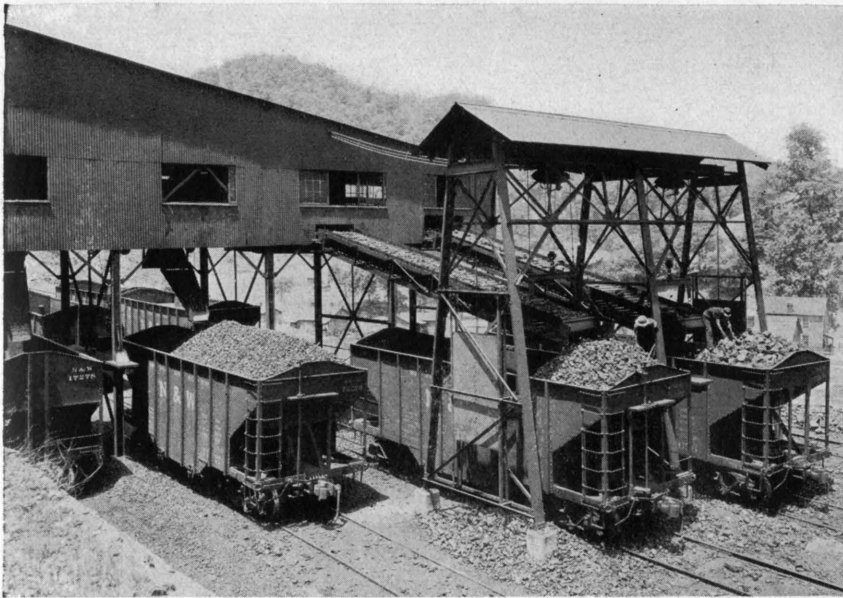
The No. 2 Gas (Pond Creek, Freeburn, Warfield) and Clintwood seams are mined largely in the Thacker District of the Williamson Field. These coals are used principally for the making of manufactured gas, metallurgical and by-product purposes. They are also superior for steam and domestic use.

The Cedar Grove (Thacker, Red Jacket) and Winifred seams are mined in the Williamson Field. These coals are blocky, hard and stand transportation and storage without deterioration. They rank high as domestic fuel, as steam coals and for gas producer use. The Cedar Grove coal, on account of its long flame burning characteristics, is especially adapted for brick burning and both ceramic and cement manufacture.

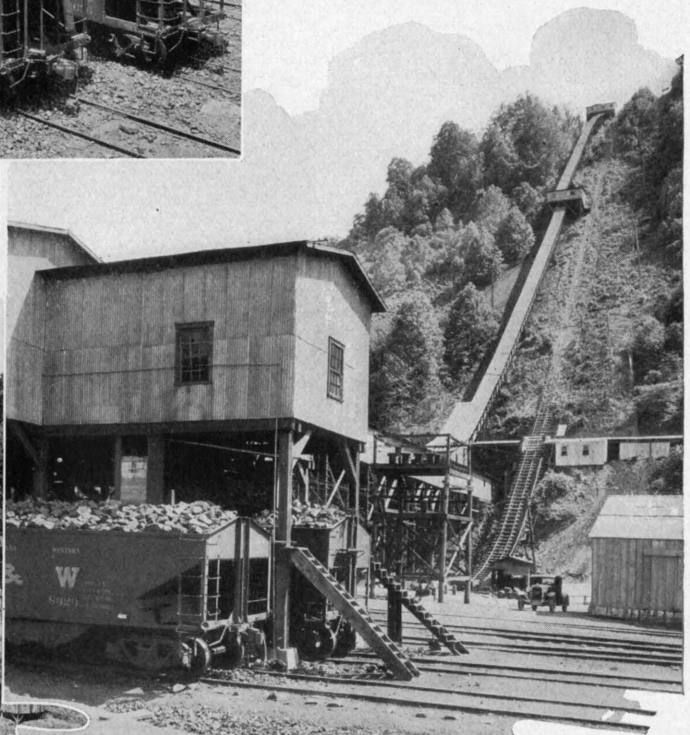
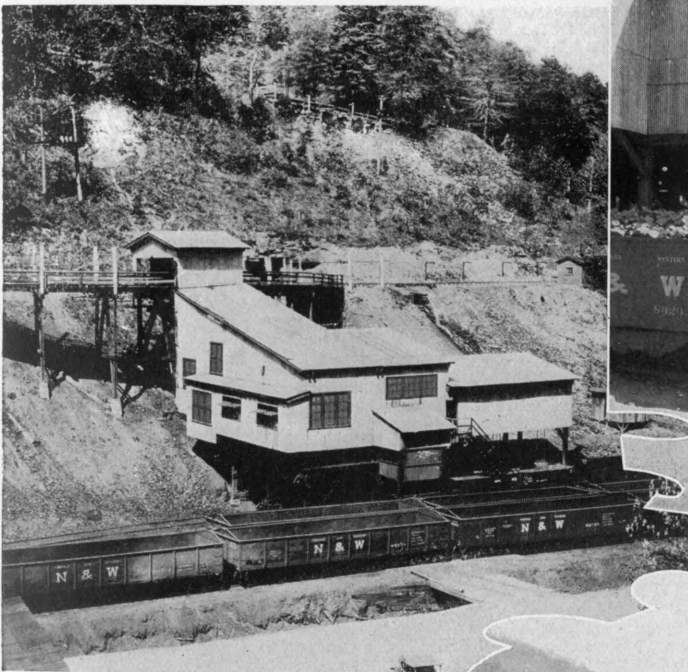
The Upper and Lower Banner and Red Ash seams are mined in the Clinch Valley Field. This coal, of splendid quality, is used for steam, domestic and railroad purposes. A dozen other seams are mined, more or less extensively, and produce coal of uniform high quality.

High volatile Fuel Satisfaction manufactured and loaded clean at a modern coal tippie in the Thacker District of the Williamson Field

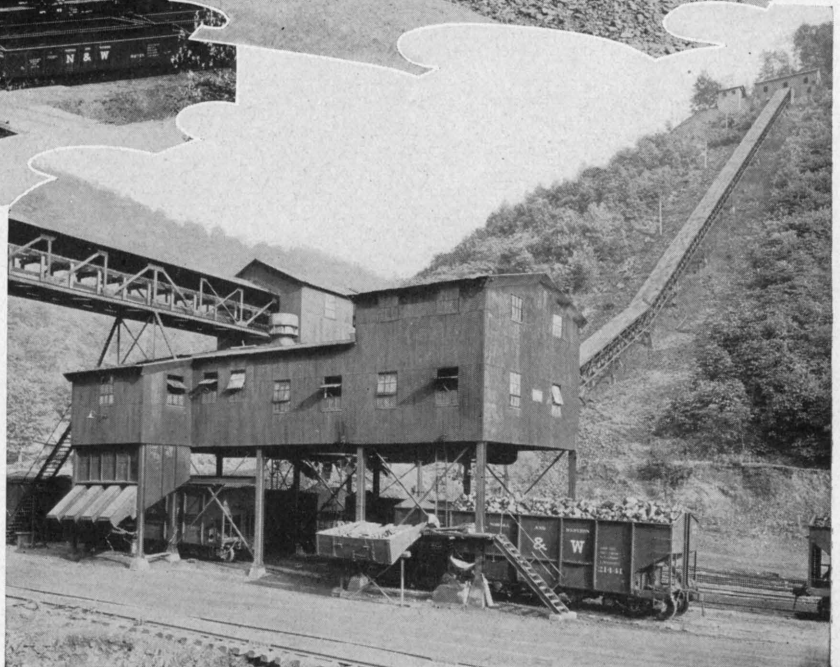




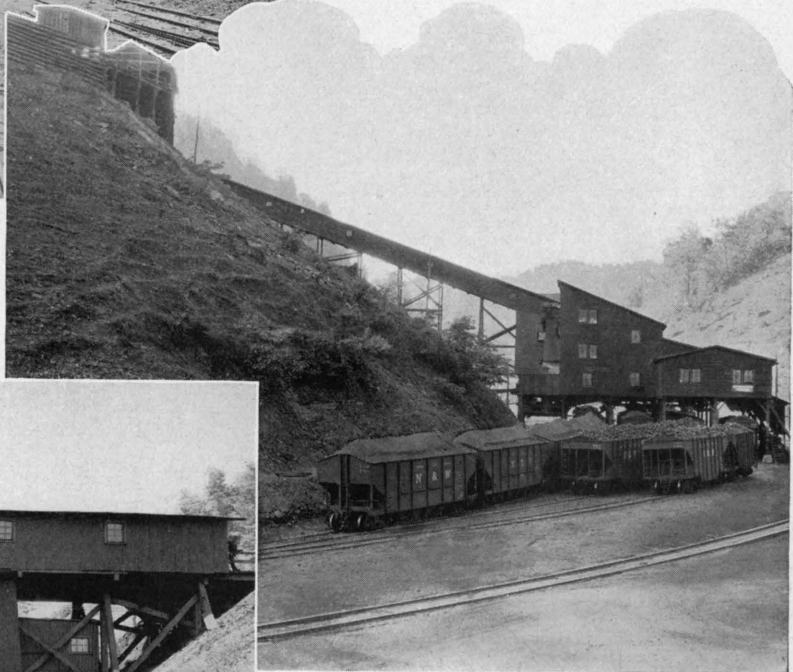
**WHERE HIGH
VOLATILE FUEL
SATISFACTION IS
MANUFACTURED**



Typical plants in the
Williamson Field where
high volatile quality
coals are produced and
properly prepared for
the market



IN THE CLINCH VALLEY FIELDS



Modern coal tipples pre-
dominate in all of the
fields producing Fuel Sat-
isfaction. The result is
a uniform, clean, high-
quality product

OTHER COALS INCLUDED IN FUEL SATISFACTION

IN ANSWERING the question, "What is Fuel Satisfaction?" it was stated in the first chapter of this booklet that "Fuel Satisfaction is a name given to a *wide variety of coals* so that every fuel requirement, whether it be domestic, industrial or special, can be met satisfactorily by the use of these coals." Brief mention has already been made of low volatile, medium volatile and high volatile Fuel Satisfaction—and the range is completed with coals from the Virginia Anthracite Field which lies in Montgomery and Pulaski Counties, Va.

These coals, as their name implies, are "hard coals," well fitted by nature and by manufacture to hold their own in competition with the similar products of other fields. They are used for domestic purposes and in industrial plants and the demand for these coals is steadily increasing in various sections throughout the country.

It is interesting to note that this coal was mined prior to the coming of the railroad in the latter part of the nineteenth century. It was then hauled across the country to the nearest railroad station on the Atlantic, Mississippi & Ohio Railroad, now part of the Norfolk and Western. These mines have been in practically continuous operation since that time.

The coals comprising Fuel Satisfaction have, for convenience in describing them, been divided roughly

into four general classes—low, medium and high volatile and semi-anthracite. It should be remembered by the consumer that such a general classification is arbitrary because the chemical composition of all coals varies somewhat as between seams in the same field and even between mines working in the same seam. As a result of this natural variance in composition, it is possible to obtain a Fuel Satisfaction coal that is perfectly fitted to meet any requirement. In fact, the variety of the coals comprising Fuel Satisfaction is a decided asset to the railroad which proudly advertises itself as the "Carrier of Fuel Satisfaction"; it need make no reservations in its insistence that on its lines will be found a coal that will give entire satisfaction whatever the use for which it is purchased.

This chapter, together with the two preceding, complete the description of the actual coals included in Fuel Satisfaction. But Fuel Satisfaction is not just coal—it is a manufactured product. As such, any description of the raw material is but half the story—and so the remaining portions of this book are devoted to the mining, manufacture, transportation, marketing and burning of Fuel Satisfaction; to the other elements in addition to chemical composition, that are essential to your satisfaction with—Fuel Satisfaction.

One of the large coal tipples in the Virginia Anthracite Field



THE MINING OF FUEL SATISFACTION

WHEN MEN DIG DEEP into the rugged hills of West Virginia, Kentucky and Virginia, in the territory where Nature countless years ago laid down vast beds of Fuel Satisfaction, a manufacturing process is started. It is a long and careful process of converting a raw material into a product that will answer efficiently all of the demands of industries and individuals for a fuel that gives complete and consistent satisfaction.

At the present time there are nearly 150 mines in operation in this "Empire of Fuel Satisfaction". The mines vary in capacity, the larger ones having an output of 75 to 100 cars per day—measured in terms of 50-ton cars. Many of the operating companies have a number of mines.

At practically all mines the method of mining Fuel Satisfaction is the same—modern and highly efficient. The coal seams lay flat or nearly horizontal and are pierced with main and cross haulageways, which are driven into the coal seams. Actual mining is done on the "room and pillar system", the coal being removed from adjacent rooms with "pillars" between to support the roof. Subsequently, the coal

in these pillars is removed, allowing the overhanging strata to cave in. A maximum recovery with a high degree of safety is thus obtained.

The actual mining operation in a "room" begins with undercutting or overcutting. This work is performed by electrically operated machines that cut out a thin layer of coal across the bottom or the top of the coal seam; a layer about four inches thick and six feet into the coal face.

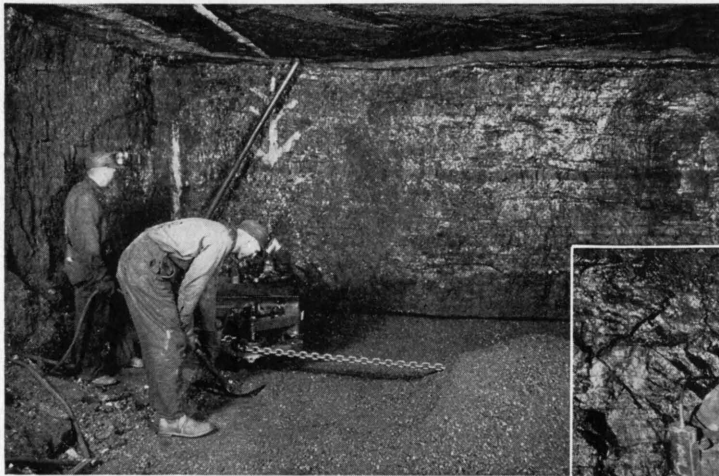
The second operation is drilling, which is done either by an electric drill or a hand drill. The coal is then ready for release from its ancient storehouse.

Explosives are tamped into the drill holes, the area in front of the coal face is carefully cleaned of all foreign matter and the "shot" is made electrically, the undercut or overcut areas allowing the coal to break away from the seam with a minimum of deterioration.

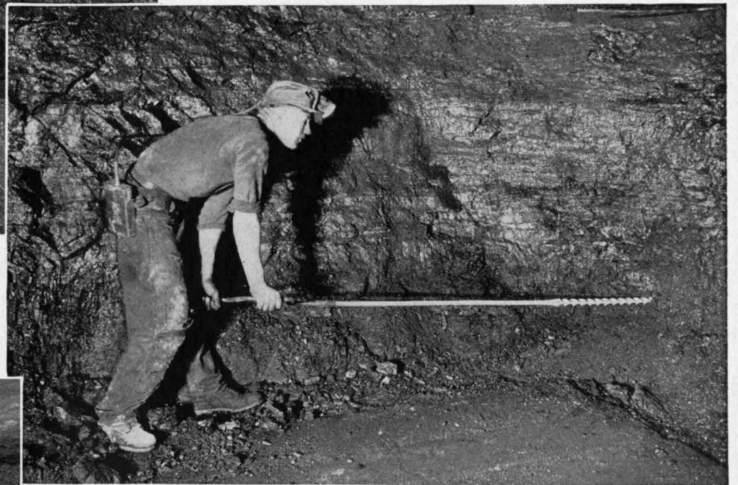
The coal is then loaded by miners into mine cars which are picked up by electric motors, assembled and hauled to the mouth of the mine, thence on to the "head-house" or point where the coal is emptied from the mine cars for the remainder of the manufacturing process.



A "face" of coal in a mine "room" at the beginning of the cycle of mining operations. Note the boards on each side of the mine track. These boards prevent the shoveling of bottom impurities into mine cars



Undercutting, the first step in mining Fuel Satisfaction



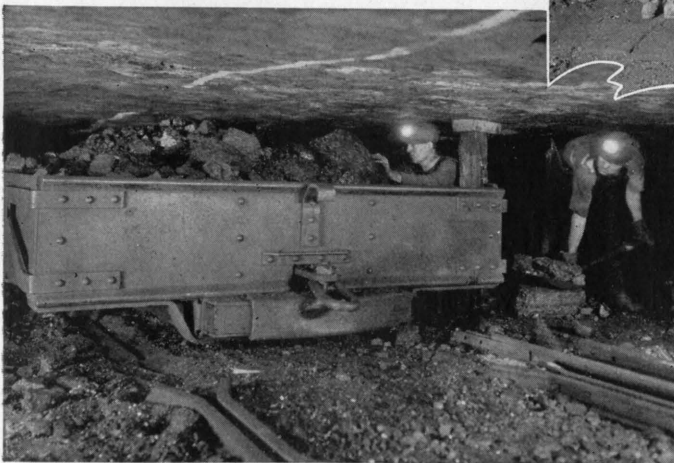
Drilling, the second step in mining Fuel Satisfaction



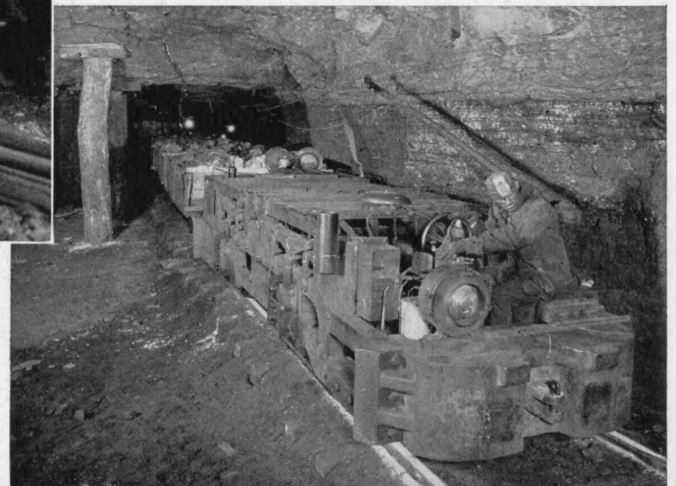
Loading the drilled hole with explosives



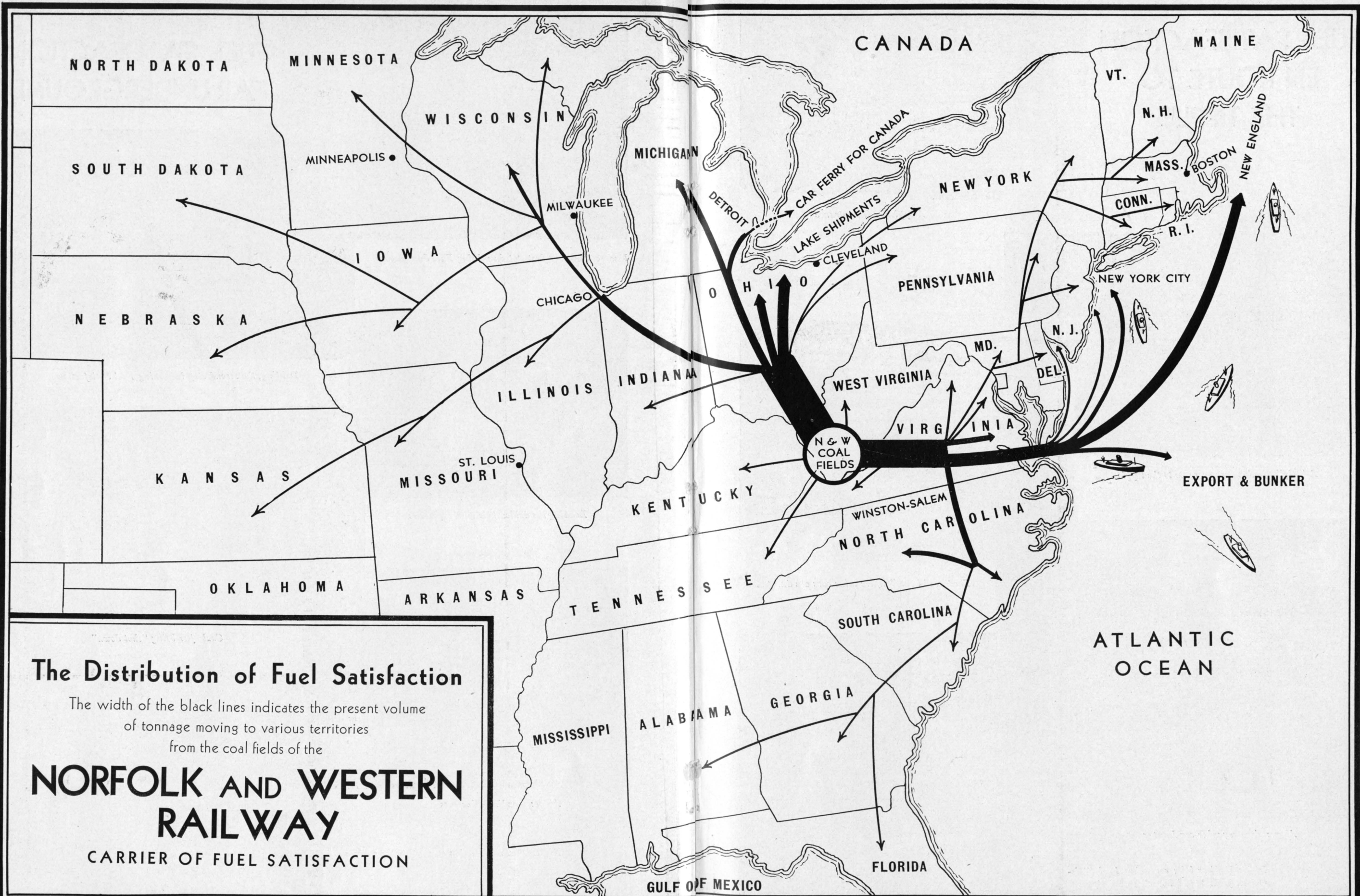
Coal after being "shot down"



Above: Loading mine cars



Right: Fuel Satisfaction en route to the surface



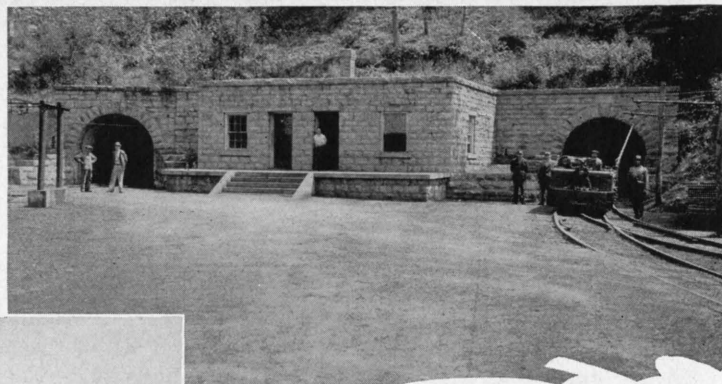
The Distribution of Fuel Satisfaction

The width of the black lines indicates the present volume of tonnage moving to various territories from the coal fields of the

NORFOLK AND WESTERN RAILWAY

CARRIER OF FUEL SATISFACTION

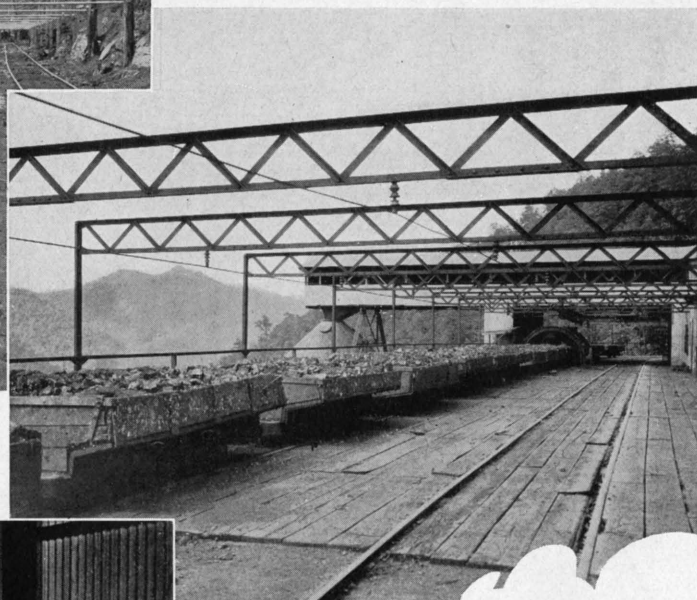
FUEL SATISFACTION EN ROUTE TO THE TIPPLE



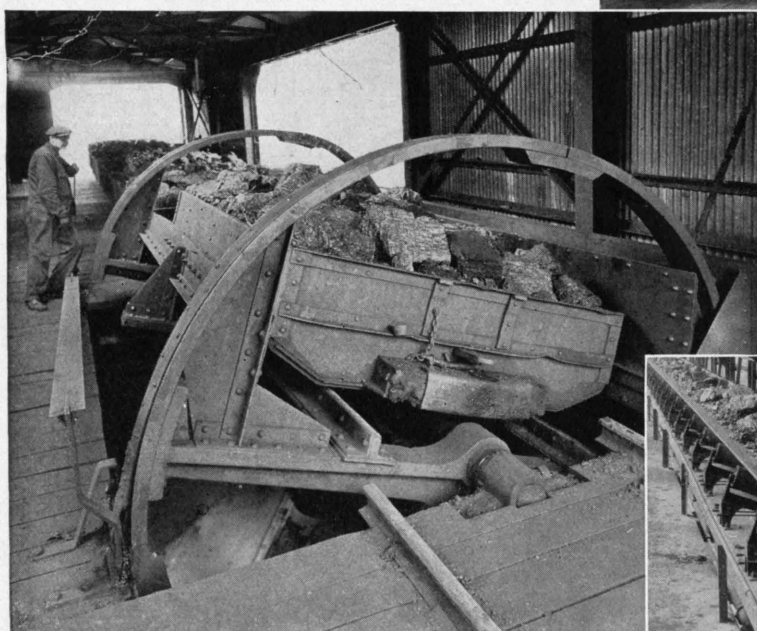
A typical mine entrance



A "trip" of mine cars en route to the tipple



The "head house" where mine cars are dumped



Above: A rotary mine-car dumper



Right: Endless belts conveying Fuel Satisfaction from "head house" to the tipple

THE PREPARATION OF FUEL SATISFACTION

IF A VETERAN coal man were to be asked to name the greatest asset of Fuel Satisfaction—aside from its ideal composition for any and every purpose—he would undoubtedly mention first its effective preparation; in other words its cleanliness, its freedom from foreign matter, its correct sizing and careful handling to insure the minimum of degradation. For Fuel Satisfaction is properly—and modernly—prepared. From the time it is dumped from mine cars until it is lowered gently into waiting railroad cars below the tippie, it has passed through a complex manufacturing process.

Let's follow the course of Fuel Satisfaction through this process.

The coal, in long "trips," or trains, of mine cars is hauled from the mouth to the unloading point by electric mine motors. The mine cars are then unloaded either by a rotary dumper or by tilting the car so that the coal is discharged through an end gate into small hoppers immediately under the unloading machinery.

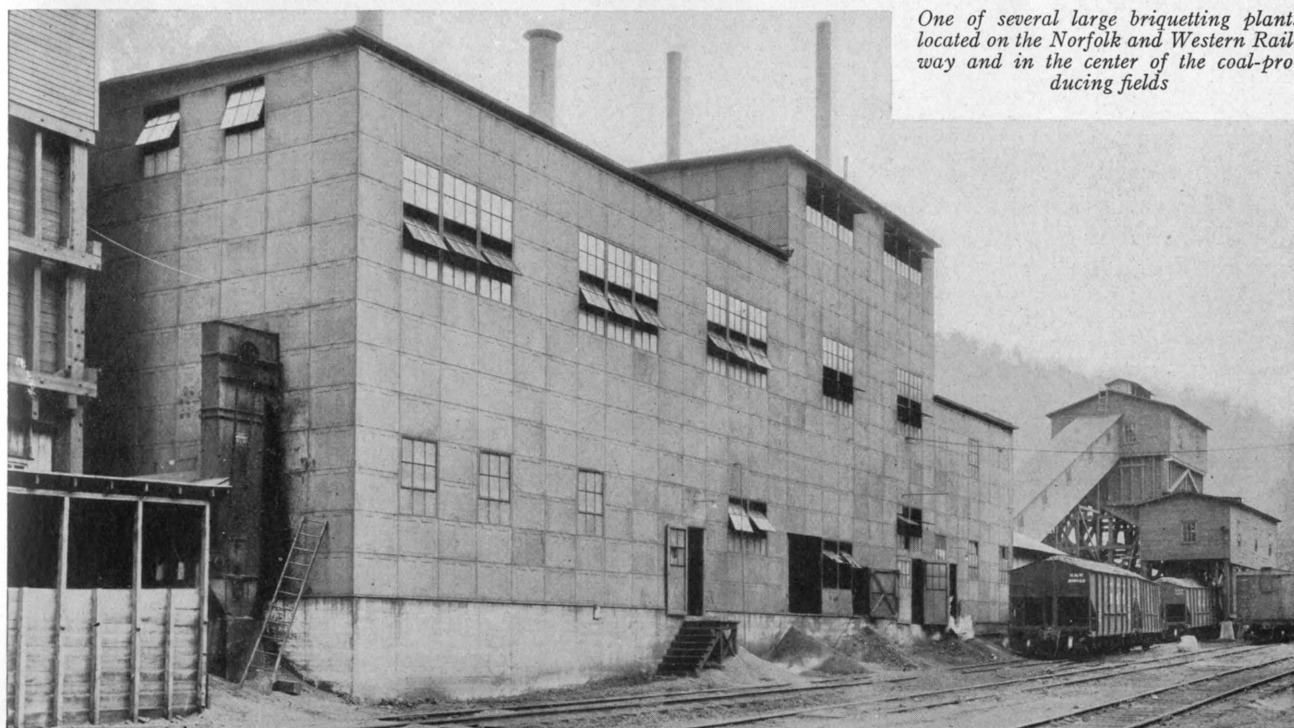
When the seam of coal being mined is on the same level as the tippie, the mine cars are unloaded into hoppers at the top of the tippie itself.

After being unloaded into hoppers, either above or

below the tippie, the coal is moved to the tippie by conveyors. Here is another evidence of the care with which Fuel Satisfaction is handled to prevent breakage.

Coal as it comes from the mine is known as run of mine (ROM) coal and contains all sizes from slack or fine coal to the larger sizes. When shipped as such the coal first passes through the tippie where it is carefully cleaned, after which it is loaded into railway cars over adjustable loading booms.

In preparing sized coal, as it reaches the tippie it is fed onto a series of shaking screens which separate it into the various sizes required by domestic and industrial consumers. These screens are tilted slightly and are mechanically moved back and forth a distance of about six inches so that the motion, plus the force of gravity, keeps the coal moving onward. The first screen contains hundreds of very small holes through which the slack coal passes directly to railroad cars underneath. The next screen contains slightly larger holes through which the pea coal passes to another phase of the manufacturing process which will be described later. Similarly, the remaining coal passes over other screens which take out the nut, stove and egg sizes,



One of several large briquetting plants located on the Norfolk and Western Railway and in the center of the coal-producing fields

leaving at the end of the shaking screens only the large lump coal.

From the point of this separation of the coal into sizes, the manufacturing process takes several courses. In many tipples the small sizes of coal are washed—a process that cleans the coal by separating it from all foreign matter. This process is based on the difference in the specific gravity, or weight, of coal and the usual foreign materials that may pass through the shaking screens despite the utmost care in mining, loading and handling. Immersed in water the foreign materials settle to the bottom of the washing tank more rapidly than coal and are drawn off, leaving only the clean coal for delivery to the loading booms.

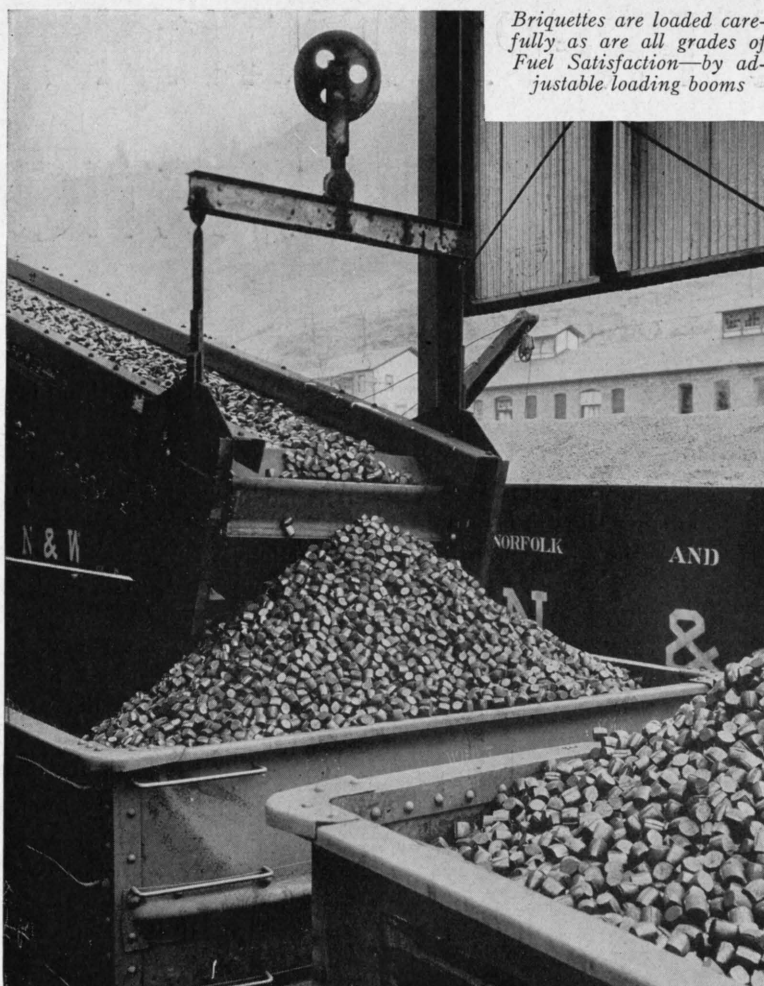
In some tipples, the smaller sizes of coal are dry-cleaned—a process that also cleans the coal by separating it from all foreign matter. This process also uses the principle of a difference in weight between coal and other substances, air and agitation being the factors causing the separation rather than water.

The larger sized coal, after being screened, passes onto picking tables where alert, expert workmen pick out the foreign matter as the coal slowly moves past them.

Practically all of the mines producing Fuel Satisfaction have tipples equipped with shaking screens and picking tables, so that this part of the manufacturing process is a common asset of Fuel Satisfaction. Many of the tipples, in addition, have the washing and dry-cleaning apparatus briefly described above so that the consumer can have his Fuel Satisfaction as he likes it—washed, dry-cleaned or hand-picked—and always as clean and free from foreign matter as any coal can be.

After the screening and cleaning processes are completed the coal is conveyed to railroad cars by adjustable loading booms which gently lower

Briquettes are loaded carefully as are all grades of Fuel Satisfaction—by adjustable loading booms



the coal into the cars with a minimum of breakage. These booms are simply movable, endless belts so that the coal is handled with the utmost care.

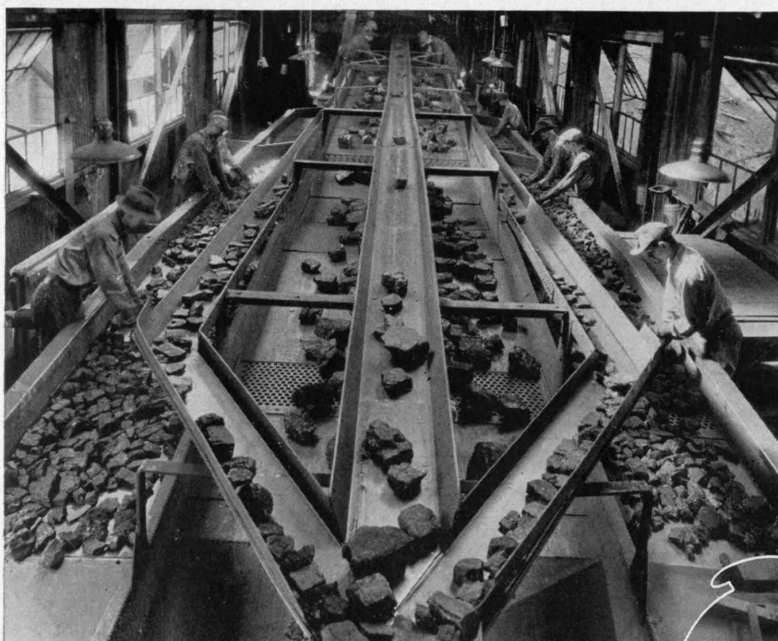
In recent years there has developed a large demand for dustless treated coal and consequently a large number of Fuel Satisfaction tipples are equipped to so treat the product. Sprays are located at the end of the loading booms and as the coal passes into the railroad car it is given a thorough coating of calcium chloride or some similar compound in solution. The result is a product that is not only clean but dustless

as well—a strong “selling point” for the retail dealer.

Proper, complete and efficient preparation of coal is one of the factors that go to make up Fuel Satisfaction. It should be obvious from this general description of a manufacturing process that the consumer of Fuel Satisfaction is assured of a clean product that has been made right by nature and mined and prepared modernly by man. It is only by such a combination that these coals have earned their right to a preëminent place in the fuel markets of the world.

The “raw materials” of light, heat and power, buried so long in the rugged hills of West Virginia, Kentucky and Virginia, are valueless until brought to the surface, prepared for use and transported to the homes and work shops of the nation. The development of the mining properties, the sales organizations and the kindred activities necessary to give value to these “raw materials” has been a tremendous task. Yet, these fields have been fortunate in having wise, progressive, far-sighted leadership. Similarly, the Carrier of Fuel Satisfaction has developed its facilities and services apace with progress in the mining and preparation of these coals. The result is that today “the story of Fuel Satisfaction” is one that is complete—your assurance of satisfaction.

FUEL SATISFACTION MANUFACTURING PLANTS



A modern picking table where each size of Fuel Satisfaction is inspected and impurities removed by experts



Trained pickers spot all foreign matter as it passes slowly by

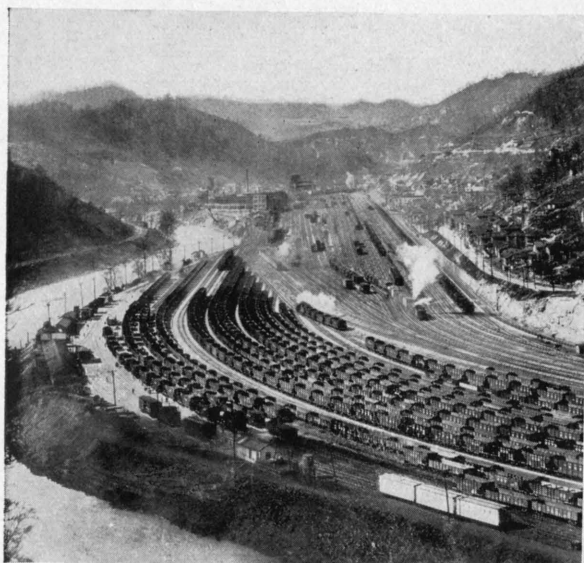


Above: Adjustable loading booms carefully lower the clean, sized Fuel Satisfaction into coal cars

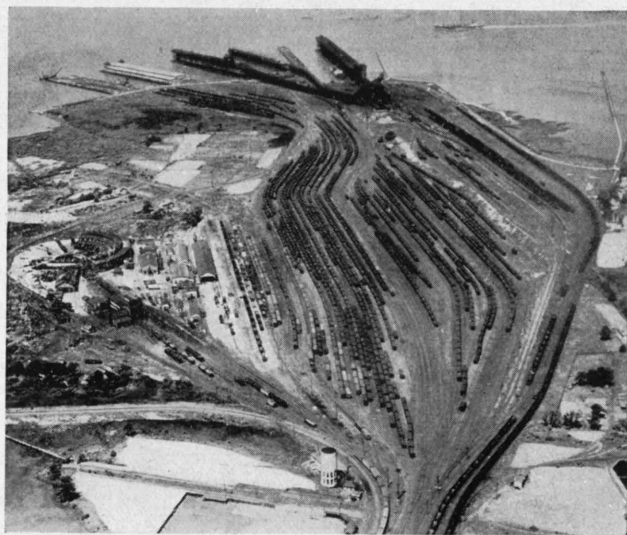
Right: The loading of five sizes of Fuel Satisfaction into railway cars



CARRIER OF FUEL SATISFACTION



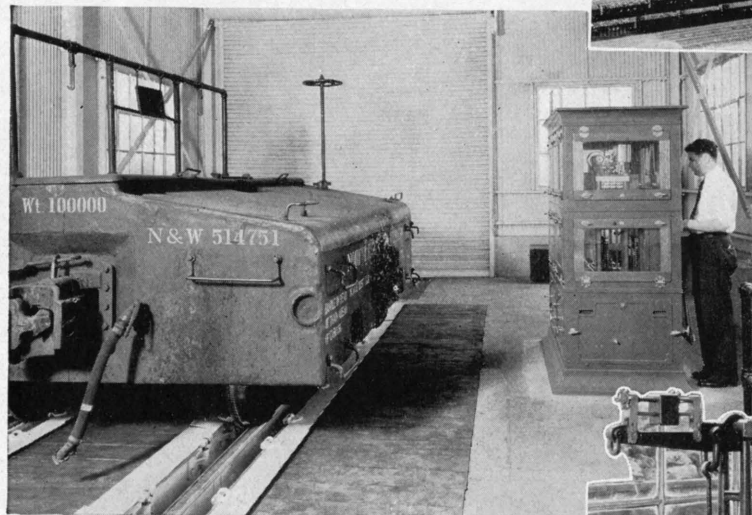
Williamson, W. Va., yards where a river course was changed to meet requirements



The Lambert Point (Norfolk), Va., yards adjoining the coal piers



A small portion of the Portsmouth, Ohio, yards



Above: The railway's master scale verifying the weight of a test car



Right: An automatic scale weighing loaded coal cars at Portsmouth

THE TRANSPORTATION OF FUEL SATISFACTION

HOWEVER WELL Fuel Satisfaction may be made by Nature or how carefully mined and prepared by man, it would still be commercially valueless without adequate, efficient transportation from tipple to market. It is just such a service that completes the story of Fuel Satisfaction—the service of the “Carrier of Fuel Satisfaction.” A word about this transportation service:

The main line of the Norfolk and Western Railway extends from Norfolk, Va. (the world-famous Atlantic port at the entrance to Chesapeake Bay), to Columbus and Cincinnati, Ohio, near the largest fuel-consuming sections in the country. It has additional lines to Bristol, Va., Winston-Salem and Durham, N. C., and Hagerstown, Md. The distance from Norfolk to Columbus is 663 miles and the coal fields are about midway, being somewhat nearer to Columbus than to Norfolk. Through the railway's connections at Columbus, the great lake coal docks at Sandusky and Toledo, Ohio, are reached quickly and economically. Through its rail connections at Columbus, Cincinnati and other Ohio junctions, fuel consumers in the Chicago District, in Cleveland, and the Youngstown and Pittsburgh Districts, in Michigan and Canada and throughout the Middle West are reached with ease. Via Winston-Salem,

Durham and other gateways the railway reaches the Carolinas and the Southeast with its superior coals; via Hagerstown it reaches the Middle Atlantic and New England States. To Tidewater at Norfolk (Lambert Point) there is a direct short line from the mines. And from Norfolk Fuel Satisfaction is moved in great volume by water to fuel-consuming points throughout the world, particularly to New England and Middle Atlantic destinations.

The railway has 2,220 miles of line, 618 miles of second track, 13 miles of third track and 1,736 miles of sidings and yard tracks, a total of 4,587 miles of line. The main line of the Norfolk and Western, between Columbus and Norfolk, is double-tracked. Heavy rails are used on both the main line and important branches. Train movements are protected and facilitated by automatic signals. Norfolk and Western motive power is of the heaviest type, ample in volume and maintained to give a maximum degree of efficiency. To a large extent tonnage trains are handled, within the limits of the coal fields, with electric locomotives.

An ample supply of coal-carrying equipment of various types is provided by the railroad with the idea, not only of insuring economical and efficient transportation, but also of meeting the requirements of the consumer. This equipment ranges from

Bluefield, W. Va., the “Capital of the Black Diamond Empire,” on the eastern border of the Pocahontas Coal Field



cars of 57½-ton capacity to those of 100-ton capacity, the total number of coal and coke cars available for service being 38,795. Car shortages on the Norfolk and Western Railway have been unknown for many years.

The tidewater terminals of the Norfolk and Western are located at Lambert Point (Norfolk), Va., on Hampton Roads, one of the world's finest harbors. Here there are three modern steel coal piers for transferring coal from railroad cars to vessels. Pier No. 2, 800 feet long, is equipped with special chutes and conveyors for loading small vessels and bunkering tug boats. Pier No. 3, 867 feet long, provides berthing space for four large vessels, and is especially equipped for loading graded coal. Pier No. 4, 1,200 feet long, provides berthing space for six large vessels. As much as 61,509 tons of coal have been dumped at these piers in one day.

To further facilitate efficient service the tidewater terminals are provided with ample yards for storage and switching service (a capacity of 5,000 cars) as well as ample berthing space for vessels. Experience has demonstrated that these tidewater terminals are capable of handling 1,200,000 tons of coal per month.

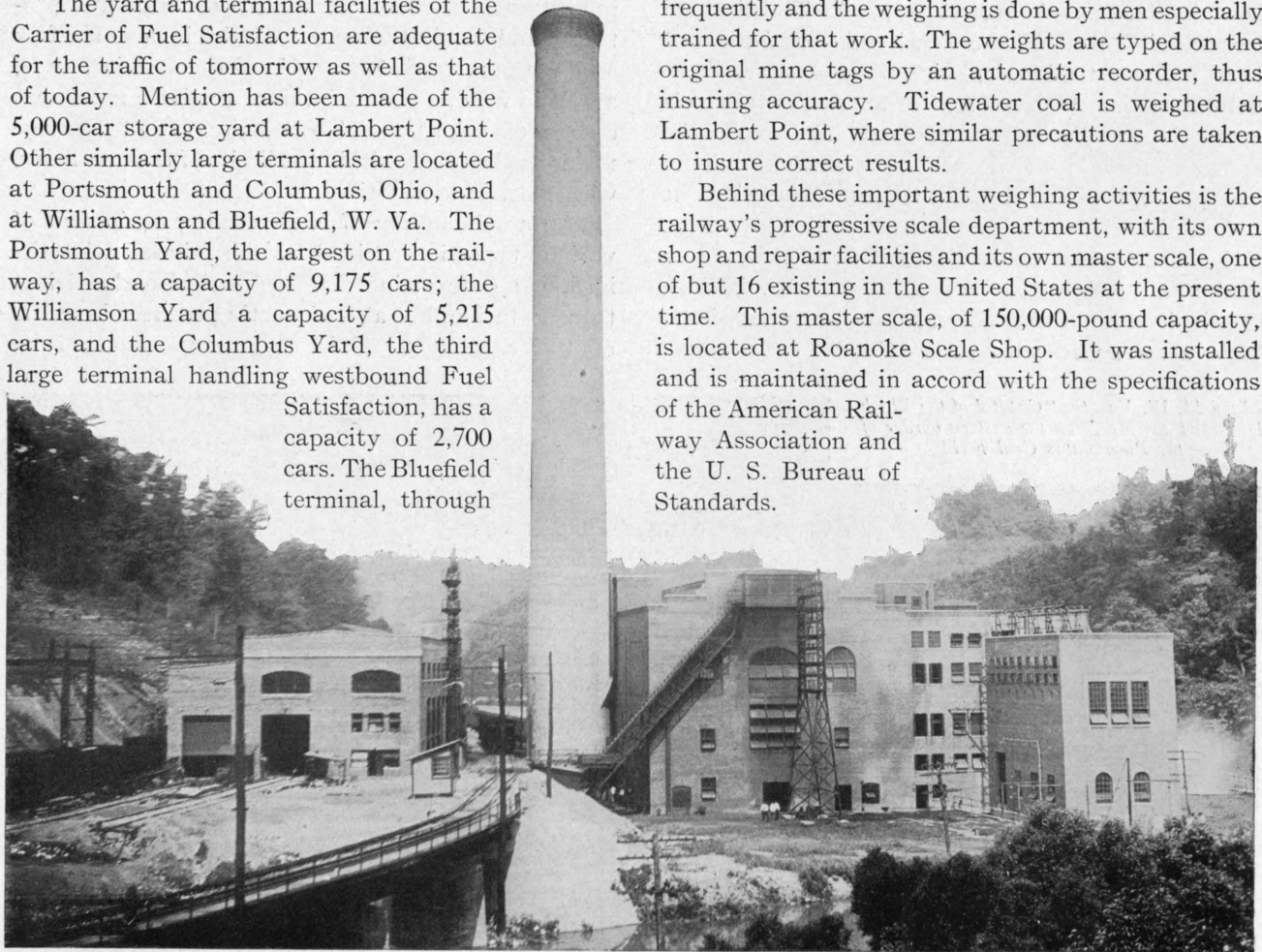
The yard and terminal facilities of the Carrier of Fuel Satisfaction are adequate for the traffic of tomorrow as well as that of today. Mention has been made of the 5,000-car storage yard at Lambert Point. Other similarly large terminals are located at Portsmouth and Columbus, Ohio, and at Williamson and Bluefield, W. Va. The Portsmouth Yard, the largest on the railway, has a capacity of 9,175 cars; the Williamson Yard a capacity of 5,215 cars, and the Columbus Yard, the third large terminal handling westbound Fuel Satisfaction, has a capacity of 2,700 cars. The Bluefield terminal, through

which moves all eastbound Fuel Satisfaction, has a capacity of 2,605 cars. These yards alone could hold 24,700 coal cars and from this fact can be gained an idea of the preparedness of this Carrier of Fuel Satisfaction.

The method of consigning and waybilling coal mined on the Norfolk and Western is unique. Eastbound coal is weighed and waybilled at Bluefield, and westbound coal at Portsmouth, with certain exceptions. Cars may be consigned at the mine through to their ultimate destination, or under certain regulations, may be forwarded to the scales on "mine tags" where the shipper, through his accredited representative, has the privilege of completing the shipping instructions. This method is advantageous both to the carrier and its patrons for, by completing the shipping instructions at the scales, orders can be filled more quickly than would otherwise be possible. In either event the cars are weighed, and the waybills prepared, at the scale points mentioned.

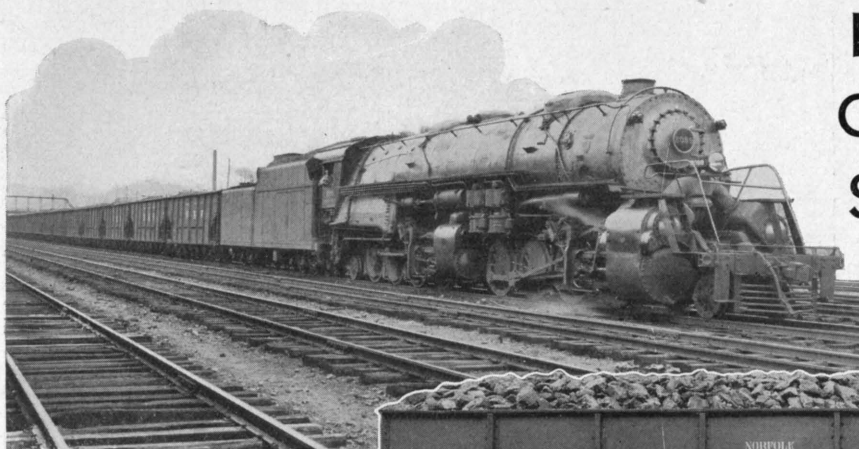
Coal is generally sold and the freight charges assessed on railroad scale weights. Therefore, accurate weighing is of paramount importance to the shipper, the carrier and the customer. At both Bluefield and Portsmouth the scales are the best that can be obtained. They are balanced daily, tested frequently and the weighing is done by men especially trained for that work. The weights are typed on the original mine tags by an automatic recorder, thus insuring accuracy. Tidewater coal is weighed at Lambert Point, where similar precautions are taken to insure correct results.

Behind these important weighing activities is the railway's progressive scale department, with its own shop and repair facilities and its own master scale, one of but 16 existing in the United States at the present time. This master scale, of 150,000-pound capacity, is located at Roanoke Scale Shop. It was installed and is maintained in accord with the specifications of the American Railway Association and the U. S. Bureau of Standards.



Where Fuel Satisfaction is converted into electrical power. The Norfolk and Western generating plant at Bluestone, W. Va., where current is produced for the electrified section of the railway

FACILITIES FOR CARRYING FUEL SATISFACTION



A long train of Fuel Satisfaction en route to markets



A 70-ton hopper car



A 57½-ton gondola car



A 90-ton gondola car



Above: A 57½-ton hopper car

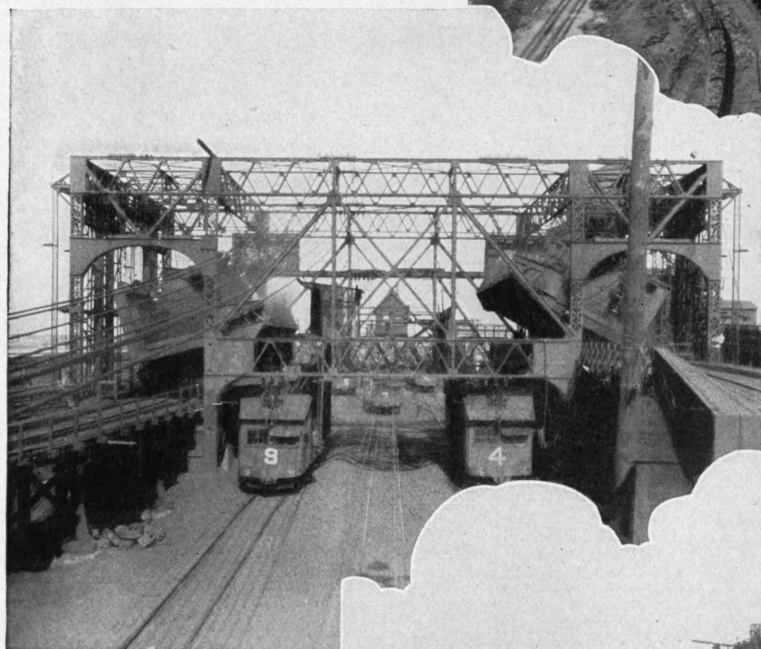
Right: Electric motors move thousands of tons of Fuel Satisfaction in each train



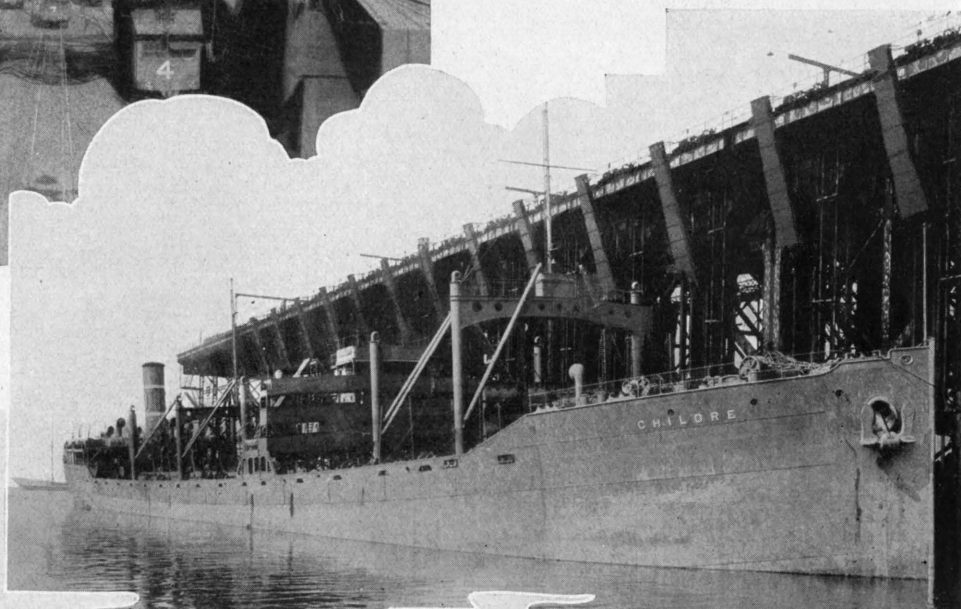
FUEL SATISFACTION AT TIDEWATER



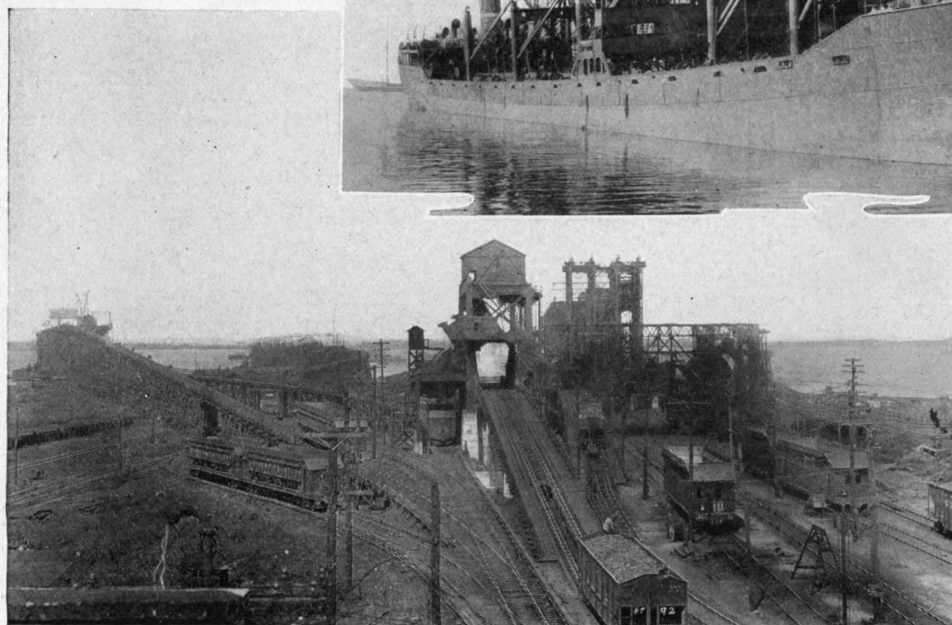
An aerial view of the Lambert Point (Norfolk,) Va., coal piers



Lambert Point has adequate facilities for properly transferring coal from railway cars to boats



Above: Taking on a record-breaking load of Fuel Satisfaction at Pier No. 4



Left: A general view of the land end of the coal piers

THE MARKETING OF FUEL SATISFACTION

WITH SUCH a variety of coals as are included in Fuel Satisfaction and with their world-wide reputation for efficiency and cleanliness it is obvious that Fuel Satisfaction can be found in use almost everywhere. Distribution is particularly complete in the eastern half of the United States, from the prairies of the Middle West and Northwest to the New England States and the entire Atlantic seaboard. The map on Pages 16 and 17 presents a picture of this distribution—and affords another evidence of the popularity of Fuel Satisfaction wherever there is a need for heat or power.

Of the total coal tonnage produced on the lines of the Norfolk and Western in recent years, about 34 per cent. moved east and 60 per cent. west from the coal fields. Approximately 19 per cent. of the total tonnage was transported to Tidewater at Lambert Point (Norfolk), Va., where it was transferred to ships carrying Fuel Satisfaction to the four corners of the earth. More than 85 per cent. of this tidewater Tonnage moved from Lambert Point, by water, to the Middle Atlantic and New England States. The remainder of the eastbound tonnage (15 per cent. of the total coal tonnage) moved by rail to the tier of states bordering the Atlantic.

Of the westbound movement of Fuel Satisfaction 18 per cent. (of the total coal tonnage) was shipped to the Great Lake ports of Sandusky and

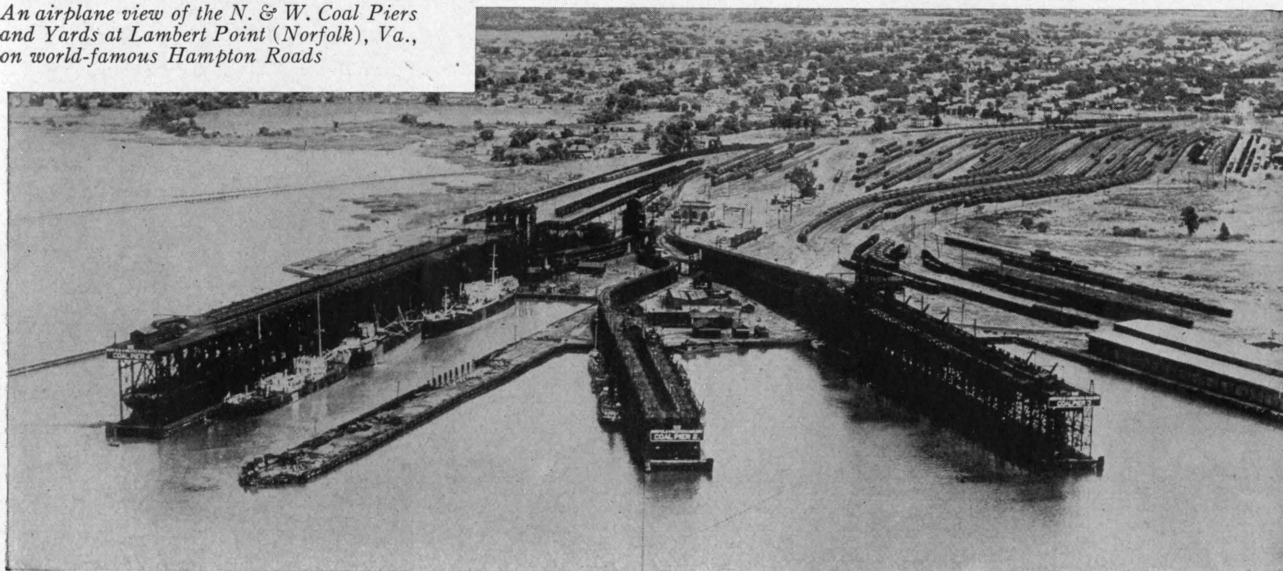
Toledo where it was transferred to vessels bound for the northwestern states and Canada. More than 41 per cent. of the total tonnage of Fuel Satisfaction moved entirely by rail to the great consuming areas of the Middle West, particularly to Chicago and the surrounding industrial districts.

Such widespread distribution of Fuel Satisfaction implies extensive and active selling organizations. Two general methods of marketing this product are utilized.

Some of the large operating companies maintain their own selling organizations, whereas, the output of other mines is disposed of through coal selling agents, who are affiliated with the mines whose output they handle. These sales organizations have offices in the principal cities throughout the country, thus maintaining a close contact with the trade, from the small country dealer to the largest industrial user. All of these selling agencies are working closely with the producers and the Carrier of Fuel Satisfaction and it is this effective coöperation between producer, distributor and seller that insures the consumer's satisfaction with—Fuel Satisfaction.

The railway has published a complete list of the selling organizations handling Fuel Satisfaction and a copy of the booklet containing this information will be forwarded upon request to any of the offices listed on Page 32 of this booklet.

An airplane view of the N. & W. Coal Piers and Yards at Lambert Point (Norfolk), Va., on world-famous Hampton Roads



BURNING FUEL SATISFACTION

PROPER OPERATION of your coal heating plant results in both comfort and economy. Comfort comes from ease in maintaining the fire and in the resultant heat; economy follows from a reduction in the coal consumed.

There are a few general rules that should be observed when operating hand-fired, low pressure heating plants burning "Fuel Satisfaction."

It is of primary importance that your heating plant be in good working condition. The combustion chamber walls or heating surfaces should be free from all scale and soot deposits in order that the maximum amount of heat may be obtained. The smoke passages should likewise be kept clean and free from obstructions. These smoke passages include the passages in the furnace itself, the smoke pipe leading to the chimney, and the chimney. This is necessary in order to obtain the proper draft and to control the burning rate of the coal.

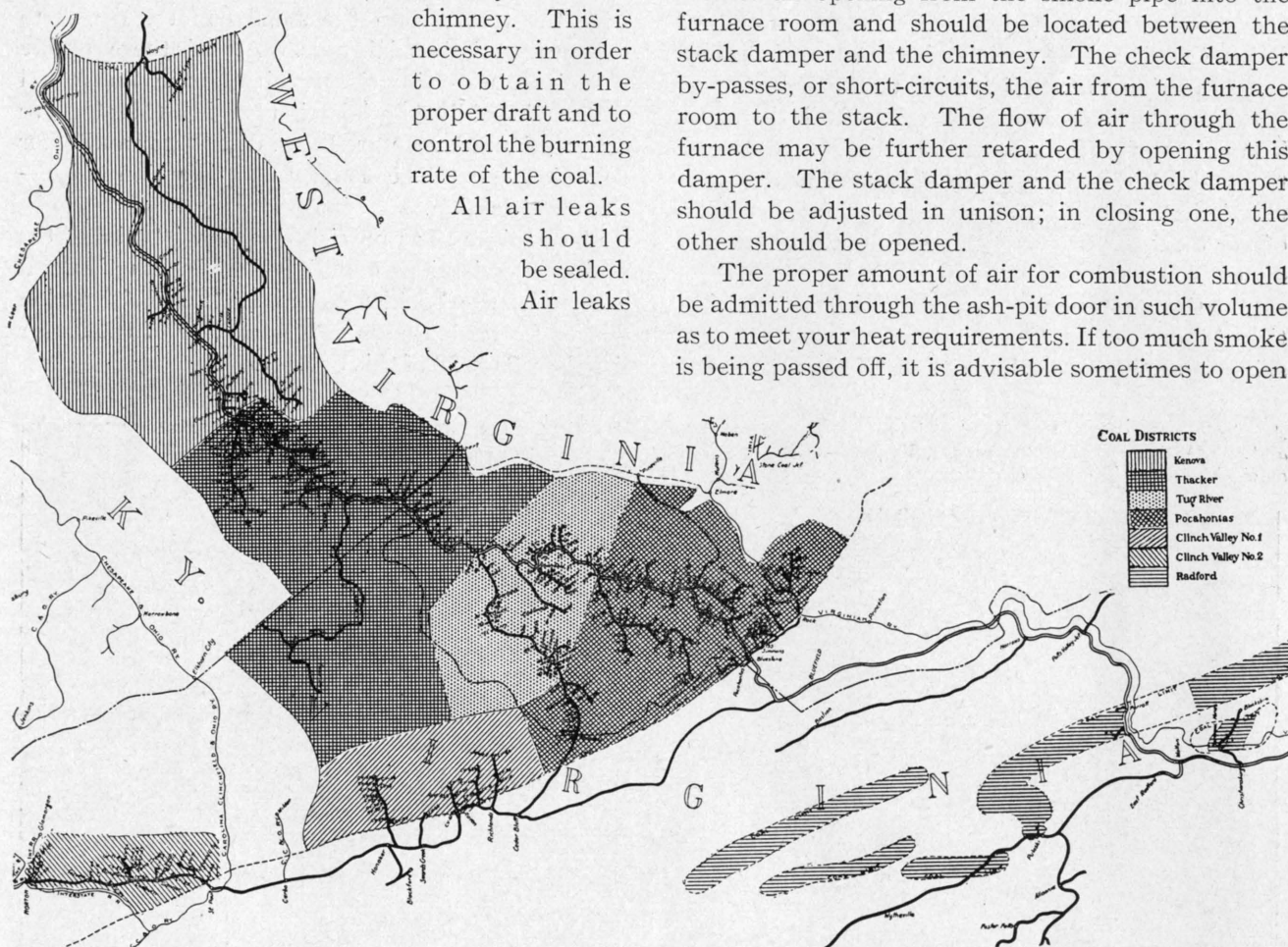
All air leaks should be sealed.
Air leaks

may be caused by warped doors, cracked castings or corroded smoke pipe (usually on the under side). Leaks may also be found in the chimney itself or where the smoke pipe from the furnace enters the chimney. If such leaks exist they prevent proper regulation of the draft and the proper burning rate of the coal.

Air is essential to the proper burning of coal and therefore you should regulate the burning rate of the coal—and the heat required—by careful manipulation of the drafts and dampers on your furnace.

The stack damper is in the smoke pipe leading from the furnace and should be between the furnace and the check damper. These dampers control the flow of air from the furnace to the chimney and this flow of air should be held to a minimum for the heat required. The check damper is the damper which creates an opening from the smoke pipe into the furnace room and should be located between the stack damper and the chimney. The check damper by-passes, or short-circuits, the air from the furnace room to the stack. The flow of air through the furnace may be further retarded by opening this damper. The stack damper and the check damper should be adjusted in unison; in closing one, the other should be opened.

The proper amount of air for combustion should be admitted through the ash-pit door in such volume as to meet your heat requirements. If too much smoke is being passed off, it is advisable sometimes to open



The Coal Districts on the Norfolk and Western Railway—the districts from which comes Fuel Satisfaction

the slide in the feed door to admit air in order to complete combustion. However, admitting air through the feed-door slide should be done sparingly.

Should there be difficulty in maintaining the proper heat, or should your furnace smoke into the furnace room, try regulating the drafts. If this fails clean the smoke passages and look for air leaks.

Thermostats or automatic damper controls are very effective for controlling draft automatically.

When adding fresh fuel always close the ash pit door and its drafts. At the same time close the check damper and open the stack damper. This will prevent smoke coming from fire door while firing, provided the furnace is in good working order. After adding fresh fuel adjust the drafts and dampers to meet your heat requirements.

It is wasteful to shake the grates too vigorously or too frequently. When a red glow begins to show in the ash pit stop shaking the grates, otherwise unburned coal will be lost with the ashes. A thin bed of ash on the grates is desirable because it protects the grate bars from the hot fire and insures a better distribution of air through the grates.

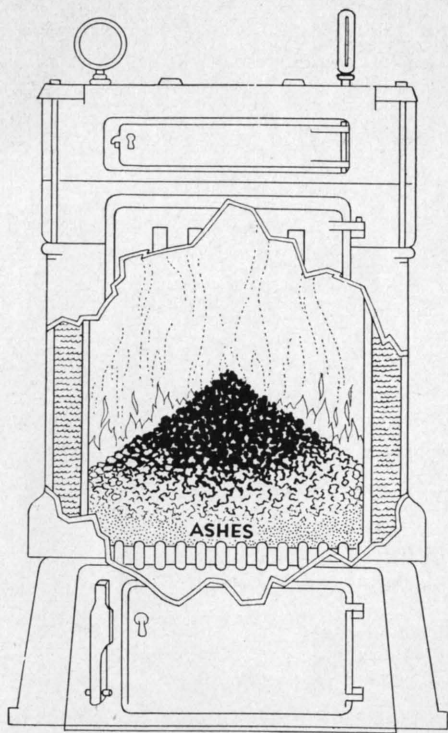
Never allow ashes to accumulate in the ash pit. Accumulated ashes will quickly warp and burn out the grate bars. It is advisable to dampen the ashes in the ash pit before they are removed to avoid dust.

In banking fires use fine coal which will coke and hold the fire longer. Never use ashes for banking fires; by so doing you may cause clinkers to form.

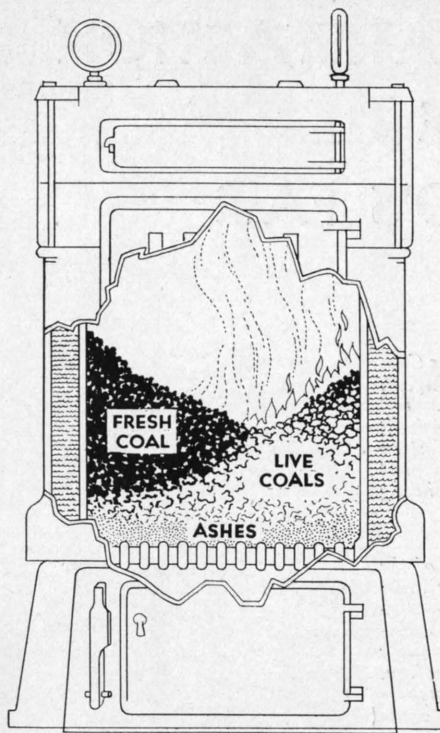
Garbage, broken dishes, glass or rubbish should not be burned in the furnace because they reduce the burning efficiency of the coal and the plant, cause smoke and may cause clinkers to form.

Be sure you buy genuine "Fuel Satisfaction" if you want the utmost in comfort and economy.

The conical method of firing Low Volatile Fuel Satisfaction has been thoroughly tested and has proven to be most economical and efficient.



The Conical Method of Firing—recommended for low volatile Fuel Satisfaction



The Alternate Method of Firing—recommended for high volatile Fuel Satisfaction

Begin at once to pile (not throw) coal in the center of the fire box, thus creating a cone-shaped pile for round fire boxes and a mound-shaped pile for rectangular fire boxes. Heaping coal in the center results in the coarser pieces rolling to the sides making the flow of air freer there and the fire hottest where

it should be hot. The slack, or fine coal, helps in building the cone; it cokes freely and holds fire longer. Bank the fire at night with slack coal.

The fire burning around all sides of the fire box consumes the gases created, eliminating objectional smoke. It also delivers heat to the radiating surfaces—and avoids insulating heating portions of the fire box.

Occasionally push a poker through the top of the cone-shaped pile and crack it before refueling. Never use a poker in a way that will stir up the fire as it is useless labor and wasteful, and may cause unburned coal to be lost in the ashes. If a quick, hot fire is wanted, don't stir; but shake the grates gently, crack the cone slightly, and open up the drafts.

The alternate method is particularly adapted to the firing of high volatile "Fuel Satisfaction."

First, heap fresh coal on one side of the fire box, letting the coal slope towards the opposite side. At the next firing, heap the fresh coal on the opposite side of the fire box. As the name implies, alternate the side filled each time fresh coal is added.

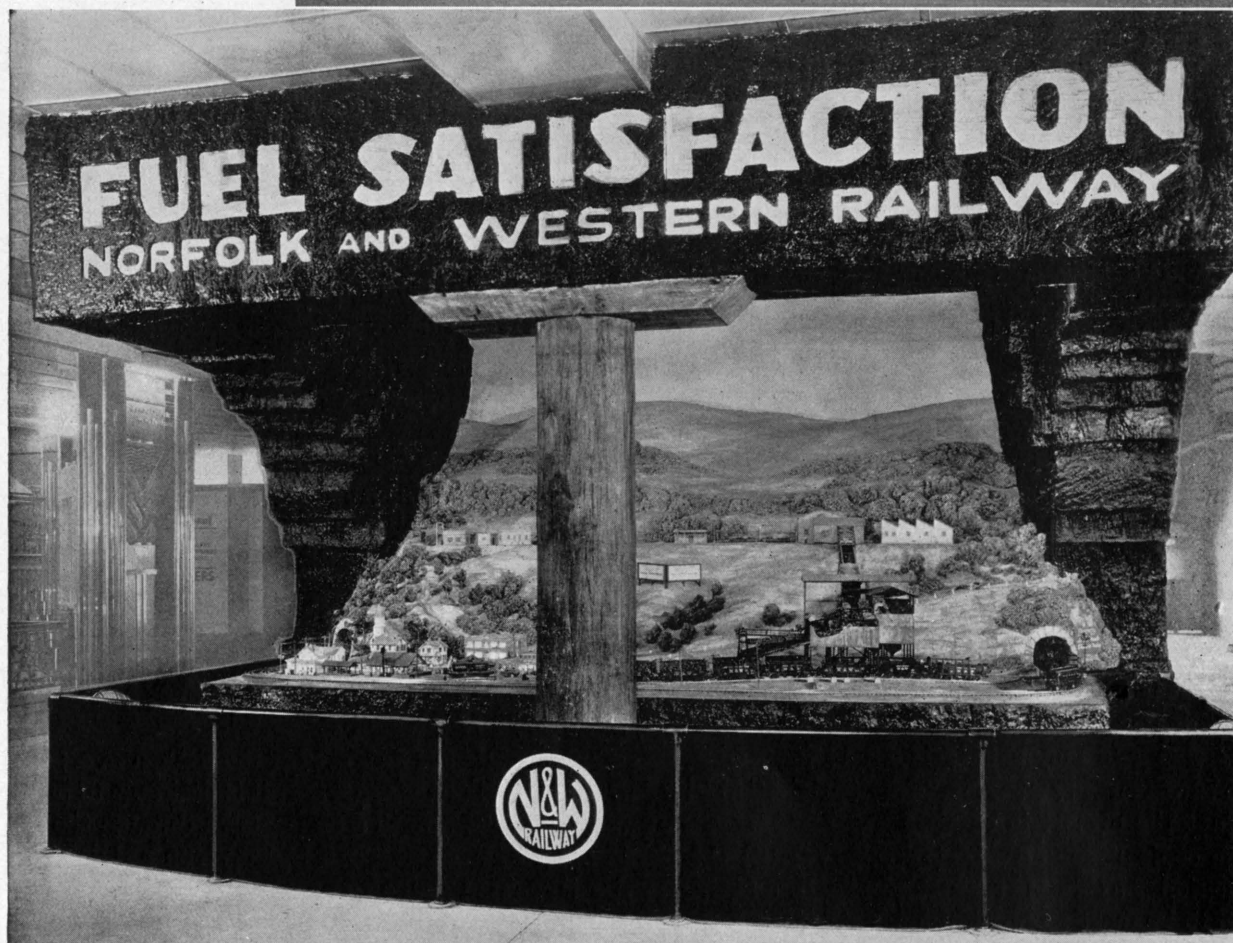
In banking, heap the fresh coal high on one side, allowing a small amount of bright fire to remain uncovered at the toe of the slope. Slack or fine coal is particularly adapted for banking.

Never stir the fire or turn the firebed over; it is wasteful and unnecessary. If it is desirable to break up the fuel bed, push a poker down through the top in order to crack the fuel bed. When a quick, hot fire is wanted shake the grates gently (do not stir the fire) then open the drafts.

FUEL SATISFACTION AT THE WORLD'S FAIR

Right: Exterior of the General Exhibits Building, A Century of Progress. The Fuel Satisfaction Exhibit of the Norfolk and Western Railway is in the first (right) wing of this building

Below: Front view of the Norfolk and Western Railway's Fuel Satisfaction Exhibit in the General Exhibits Building, A Century of Progress. The handling, preparation, and transportation of coal are illustrated by animation of the model shown. The underground steps in the manufacture of Fuel Satisfaction are displayed in a mine tunnel at the rear of the exhibit



COÖPERATION IS PART OF FUEL SATISFACTION

THE ESTABLISHMENT of the railway's coal bureaus is one evidence of the coöperation backing Fuel Satisfaction. The first of these bureaus was opened in Chicago on April 1, 1929, for the purpose of rendering "every possible aid to receivers and consumers of coals produced on and moving over" the railway's lines. The success of the Chicago Bureau led to the establishment of similar bureaus at Detroit, Cleveland, Winston-Salem and Boston—all manned by fuel experts and all working, in every way possible, to help the producers, distributors and consumers of Fuel Satisfaction.

The railway has also reorganized its official personnel, creating a new Coal Traffic Department, charged primarily with the duty of seeing that the railway's coöperative activities were successful. Again, here is an evidence that Fuel Satisfaction is backed by all of the resources of a great railroad's personnel.

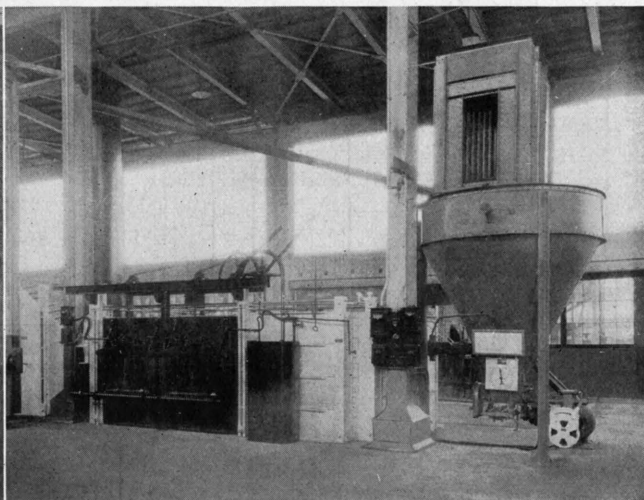
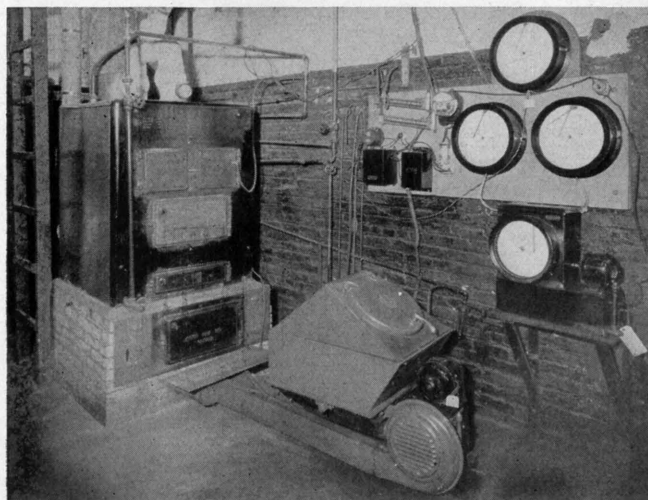
From 1927 to the present, the Norfolk and Western Railway has prepared and distributed 300,000 pieces of literature on Fuel Satisfaction, including 166,000 copies of booklets similar to this one. It has used more than 300 full pages of advertising in the coal trade journals and other magazines reaching a total circulation of almost two million. It has utilized every available medium to bring Fuel Satisfaction to the attention of the world—blotters, calendars, mail inserts, newspaper space, extensive publicity, time tables, dining car menus, employee magazines, radio

and countless speeches before civic and other organizations. And this campaign has been a consistent one extending over a period of more than five years.

Several years ago it became apparent that there was a need for accurate and dependable information regarding the performance of various sizes and types of Fuel Satisfaction in domestic automatic stokers. The railway immediately volunteered to conduct a series of impartial and exhaustive tests, providing special equipment for this purpose. Subsequently, the railway has published and distributed two booklets containing the results of these tests as well as doubled its facilities so that two stokers can be tested simultaneously. These tests are continuing and, as rapidly as possible, the results are being made public.

Similarly, by a series of exhaustive investigations of all fuels (including oil and gas) available for use in heavy forging and metallurgical furnaces the railway demonstrated, by a practical installation in its own shops at Roanoke, that pulverized Fuel Satisfaction is the most economical and efficient for this purpose.

The personnel of the railway's Coal Traffic Department, of its coal bureaus and the character of the railway's advertising and research activities clearly show that coöperation between the producers and distributors of Fuel Satisfaction on the one hand and the Carrier of Fuel Satisfaction on the other is a tangible, active element that insures the utmost in service and satisfaction for the consumer.



Left: An automatic domestic stoker under test in the laboratory of the N. & W. at Roanoke, Va. Right: Research installation in the railway's shops at Roanoke to determine the efficiency of pulverized Fuel Satisfaction, in billet heating and melting

BACKING FUEL SATISFACTION

THE COMBINATION of extensive coal fields producing superior coals, able, progressive and well-equipped organizations to mine, manufacture and market them, and the adequate transportation service afforded by the Norfolk and Western Railway, invites the careful consideration of every person confronted with the problem of creating or maintaining a dependable source of "Fuel Satisfaction".

The Coal Traffic Department of the railway and its Coal Bureaus are the mediums of contact inasmuch as they have been created to assist you in every way possible. Specific or general inquiries about the use, quality or sources of supply of Fuel Satisfaction, if addressed to any of the Norfolk and Western offices or officers listed below, will receive prompt and careful attention.

F. K. PROSSER
Coal Traffic Manager
Roanoke, Virginia

L. P. HARRELL
Manager, Coal Department
Roanoke, Virginia

G. C. VAN ZANDT
General Coal Freight Agent
Roanoke, Virginia

R. L. HAWKINS
Assistant Manager, Coal Department
Roanoke, Virginia

F. E. WILLMAN
Coal Freight Agent
Roanoke, Virginia

D. J. HOWE
District Manager, Coal Bureau
519 Marquette Building
Chicago, Illinois

N. C. DAVIS
District Manager, Coal Bureau
942 Book Building
Detroit, Michigan

J. B. GILTNER
District Manager, Coal Bureau
1161 Union Trust Building
Cleveland, Ohio

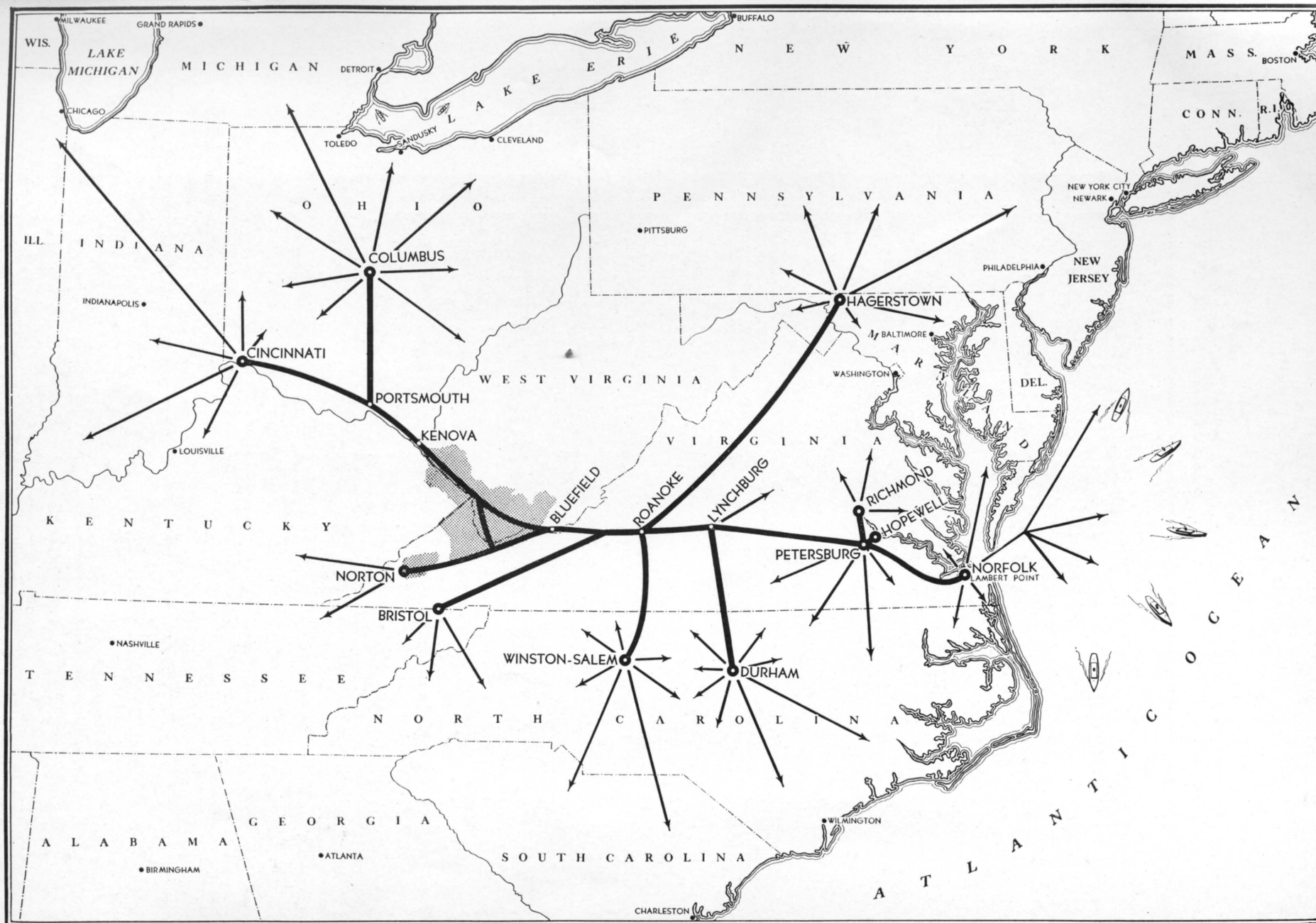
R. B. WILLIAMSON
District Manager, Coal Bureau
667, 10 Post-Office Square
Boston, Massachusetts

G. O. ELLSTROM
District Manager, Coal Bureau
1105 Reynolds Building
Winston-Salem, North Carolina

Information about Fuel Satisfaction may also be obtained from the following Norfolk and Western offices:

Atlanta, Ga., 703-707, 22 Marietta Street Building
Baltimore, Md., 537-38-39 Baltimore Trust Building
Birmingham, Ala., 1003-04 Protective Life Building
Bluefield, W. Va., 414-415 Law and Commerce Building
Bristol, Va.-Tenn., 414-16 Reynolds Arcade Building
Charlotte, N. C., 909 Independence Building
Chattanooga, Tenn., 1122 Volunteer State Life Building
Cincinnati, Ohio, 905-906 Dixie Terminal Building
Columbia, S. C., 803 Carolina Life Building
Columbus, Ohio, 619 Huntington National Bank Building
Denver, Colo., 216 Denham Building
Indianapolis, Ind., 408 Guaranty Building
Jacksonville, Fla., 911 Bisbee Building
Kansas City, Mo., 737 Railway Exchange Building
Knoxville, Tenn., 1421-22 Hamilton National Bank Building
Little Rock, Ark., 317 Gazette Building
Louisville, Ky., 321-321A and 322 Heyburn Building
Lynchburg, Va., N. & W. Ry. Freight Station

Memphis, Tenn., 401-2 Cotton Exchange Building
Minneapolis, Minn., 901-3 Metropolitan Life Building
Nashville, Tenn., 711 Independent Life Building
New York, N. Y., 225 Broadway
Norfolk, Va., Terminal Building
Oklahoma City, Okla., 1009 Perrine Building
Petersburg, Va., N. & W. Ry. Freight Station
Philadelphia, Pa., 1409 Broad Street Station Building
Pittsburgh, Pa., 1521-22-23 Park Building
Richmond, Va., 801 East Main Street
Rochester, N. Y., 1124-26 Mercantile Building
St. Louis, Mo., 1201 Missouri Pacific Building
Salt Lake City, Utah, 233 Judge Building
San Francisco, Cal., 351-353 Monadnock Building
Toledo, Ohio, 1113-14-15 Second National Bank Building
Washington, D. C., 741 14th Street, N. W.
Wilmington, N. C., 907 North Carolina Bank Building



Fuel Satisfaction is distributed in all directions from the terminals of the Norfolk and Western Railway. The shaded portion of this map is the territory where Fuel Satisfaction is produced and the heavy black lines are the principal distributing arteries of the Norfolk and Western System

