

Huge Reserve Of Limestone In State

Gazette 8-29-37

Reserves of limestone in north Arkansas are almost unlimited in quantity, according to a paper on the subject prepared by State Geologist George C. Branner and read by him at the 1937 American Institute of Mining and Metallurgical Engineers.

A conservative estimate of the amount of exposed quarryable limestone in that area would be 315,000,000 short tons, Dr. Branner said. He assigned 170,000,000 tons to the Salem plateau, including all of Fulton and Sharp counties and parts of Boone, Carroll, Benton, Marion, Baxter, Izard, Randolph and Lawrence; 130,000,000 tons to the Springfield plateau, and 15,000,000 tons to the Boston mountains, north slope.

The Springfield plateau lies between the Salem plateau and the Boston mountains, taking in parts of Independence, Stone, Izard, Baxter, Searcy, Marion, Boone, Newton, Carroll, Madison, Washington and Benton counties.

The limestone area in the Boston mountains is about 995 square miles, that on the Springfield plateau 2,645 and that on the Salem plateau 3,412 square miles, giving a total of 7,052 square miles for the entire sector. The region is traversed by about 800 miles of railroads and 1,200 miles of surfaced highways.

Production Report Incomplete.

Production figures were not available before 1923. Collection of severance tax began in that year and records have been kept since.

Production since 1923 has totaled 1,191,543.65 short tons. Independence county leads with 555,538 tons. Then come Sharp with 395,580.35; Izard, 115,470.49; Washington, 74,424; Searcy, 34,545.60; Jackson, 12,412.50; Benton, 1,688; Marion, 1,500; Baxter, 389.71.

Figures compiled by the state geologist, including some estimates, show a total of 3,729,336 short tons of stone produced in Arkansas from 1889 to 1935, inclusive. The total value was \$9,077,036. The banner year was 1930, when 345,071 tons, valued at \$626,259, were produced.

In spite of the depression, 1933 was another good year in the Arkansas stone business with total production of 251,641 short tons, valued at \$443,117.

In 1930 producers sold 183,530 tons for use as road material and 109,560 for railroad ballast. Three years later 146,760 went onto the roads, but no sales were made to railroads. There have been no building stone sales of any consequence since 1915.

Marble Finds Market.

Included in the all-time totals are 11,866 short tons of marble, valued at \$220,531. The best year for it was 1932, when 4,006 tons were sold for \$76,282. One special type, black marble, has shown considerable increase in recent years. Since 1930 a total of 32,643 cubic feet of dimension black marble and 1,070 short tons of the allied terrazzo have been sold at estimated prices totaling \$72,826.03.

"This black marble occurs in the Fayetteville and Pitkin formations of Mississippian age which crop out over an area between township 12 north, range 5 west, and township 14 north, range 16 west, an airline distance of about 68 miles," Dr. Branner wrote. "The length of the outcrop is about 200 miles. Quarryable beds have been found in an aggregate thickness of at least 20 feet, with individual beds 24 inches and less in thickness. This marble is equal to the Belgian black marble in quality and is usually recognized as the highest grade for black interior trim found in the United States."

Lime Plant To Be Built Near Guion

Special to the Gazette. 10-17-37

Guion, Oct. 16.—Edgar Baker and associates of Batesville will start the construction of a new lime plant near here within the next few days. It will be located at the St. Clair Marble Company's marble quarry, five miles south of Guion, on the Missouri Pacific railroad.

The marble company has leased them a site for the plant and will furnish them the limestone for burning. It will consume all of the waste stone and

scrap from the quarry. The plant will consist of two kilns with a capacity of 40 tons a day. They will also probably put in a crushing plant and will manufacture ballast and crushed limestone.

The construction of the plant was encouraged by the construction of new paper mills in the south part of the state. These mills use a large quantity of lime in the manufacture of paper and the White river country affords one of the nearest available supplies.

St. Clair marble is a highly crystallized limestone that burns into a high grade lime and is highly adaptable for paper making as well as for construction, agricultural and chemical purposes.

Limestone Exploration Proposed Near Little Rock. Gazette 10-27-37

The state Geology Department said yesterday that the Arkansas Geological Survey had made application to the state office of the Works Progress Administration for a grant of \$3,936 to be used in the drilling of test holes in an area about 15 square miles between Mablevale and Alexander, Pulaski county, in search of limestone.

Dr. George C. Branner, state geologist, said that drill hole records obtained in the summer of 1934 when a bauxite search was in progress indicated that there is a limestone bed through the area but that existing records are insufficient to indicate its distribution, thickness and overburden. Fifteen feet of limestone was encountered at a depth of 47 feet in Alexander.

Dr. Branner said that 14 men and one supervisor would be employed in the project. The test holes will be dug with hand drills.

The state geologist said that in the event limestone of sufficient thickness and no overburden was found it is believed that there is a good chance to obtain a sufficient amount to supply lime-using industries in this section.

The nearest limestone deposits to Little Rock are located in the Ozark mountains and in the chalk district of Little River, Sevier and Howard counties.

State Will Launch Limestone Search Democrat 10-27-37

Efforts to trace a supply of limestone in the area between Alexander and Mabelvale, soon will be launched by the Arkansas Geological Survey. The survey has made application to the Works Progress Administration for a grant of \$3,936 with which to do the work. A supervisor and 14 men would be employed at the work which would consist of drilling test holes.

Dr. George C. Branner, state geologist, said records obtained in 1934 indicated there is a large quantity of limestone in the area but that the records are not complete.

LIMESTONE PLANT AT BATESVILLE EMPLOYS INTERESTING PROCESS

By GORDON DAVIES. Special to the Gazette. 10-31-37

Batesville, Oct. 30.—About six miles northwest of Batesville is a limestone cliff. A busy little narrow-gauge railway runs from the quarry to a big white lime plant some three miles away. There are three methods of obtaining limestone for commercial purposes: Strip mining, where the product is covered by only a light layer of soil; quarrying, where it is necessary to blast away parts of the cliff to release the stone; and deep mining, where shafts are sunk to find the product. The deposit is obtained by blasting, and then loading the shattered rock, in small pieces on the dump cars waiting to receive it.

Process of Manufacture. This elevated railroad begins on the ground level, at the quarry, and runs alone like a normal railroad, until it comes near the plant—then runs up a sharp incline. At the top of the main plant, the load is dumped into the kilns. There are six of these huge kilns, each with four "eyes." An observer would call them mouths, since that is where the four-foot cord wood is fed into the furnaces. The kilns use 45 cords of woods a day. A big woodpile stands nearby.

Once the rock is dumped into the flaming, fiery furnace, it burns for four hours. At the end of that time the kilns are "drawn," a barrow is wheeled under the kiln, and the red hot burnt rock is dropped into it. It is then rolled away to be ground into various sizes, and separated by screens.

The very fine flour-like product is used in sugar making. The next finest goes into stock feed, the next into fertilizer, the coarser into roadmaking material and ballast for railway tracks.

Plant Electrically Operated. The plant is most interesting. The main building is some 500 by 10' feet in size. It contains six big kilns, 10 storage tanks (for burnt lime), screens, barrows, machinery, men, finished products and activity. The principal motive power is electricity. Almost all of the machinery is electrically operated.

North Arkansas boasts no less than seven distinct varieties of limestone. Penetremetal, upper Archimedes, gray limestone, St. Joe marble, all in the lower carboniferous, St. Clair marble, Izard limestone, magnesians, of the lower Silurian age, and Batesville white limestone. There is limestone in the Fayetteville shale, and more in Independence county. There is lenticular limestone under the Batesville sandstone. The deposits at Batesville is harder and more crystalline than others in the state.

History of Industry.

In nearly all places where large beds of limestone occur it is comparatively pure carbonate of lime. Many years ago a fine deposit was found about six miles east of Batesville. It was mined and burnt in what was known as the Jones lime kiln. Dr. J. F. Allen owned a tract on which it was burned, and some of it shipped to Batesville by rail. It also has been burnt at Cushman and Denieville and shipped to and through Batesville. The Limedale plant is about six miles northwest of Batesville. It shows the finest outcroppings of limestone to be found in a section famous for that native resource. Near Limedale is a well, 135 feet deep. It was drilled through solid stone, and the depth of the deposit was not reached when the drilling stopped. The land on which it stands is separated by a high ridge from a similar exposure, which occurs near a big spring, in what was once a part of the Spanish land grant. A beautiful deposit was found on Lafferty creek in Izard county. The quarry is now idle, although \$10,000 was spent on it. Although northeast Arkansas is so rich in limestone, with all its valuable by-products, it has been handicapped as a major resource by poor transportation facilities. A little has been exported to England. The British government made some favorable terms on transportation and the product was shipped to that country. With the coming of highways, better railroad connections and perhaps waterborne freight, the industry can mean much to the state.

Three Forms of Lime.

It is well known that lime is used in many ways and forms. First, it is used in its dry state, or it is treated with water and becomes slaked, or quick lime. Three methods are used in slaking—air, immersing and drowning. Air slaking is avoided, as far as possible, by the best producers. Immersing consists in placing pieces about the size of a walnut in a wire basket and immersing it in water for a minute or two. The pieces are then packed in casks and covered, to retain their heat and moisture. Then it is ground to powder. The drowning process consists in putting on the lime, enough water to convert it into a thick pulp. This is the preferred method in this country. Slaked lime increases as much as 3 1-2 times its unslaked volume. Perhaps it is a little known fact, that lime is absolutely essential, to the development of all plants. For instance, potatoes contain over 46 per cent of the mineral. Most of it—nearly all in fact—is produced directly or indirectly through the agency of some sort of animal or vegetable life. The common colors we find are legion—blue, grey, white, buff, black, red, brown, yellow and green. Lime stone is readily soluble in acidulated water, and forms carbonic acid gas in the water. Forty years ago, 25,000 tons of marble dust were used in manufacturing carbonic acid for soda fountains. Today, there must be many times that amount used.

Many Uses. Another little known fact is the number and variety of uses for lime. The rarest kind of limestone is the lithographic rock, very valuable, as well as rare; the best has come from Bavaria. Arkansas has this variety in Marion, Izard and Searcy counties. All we need is to have it developed. The fertility of many otherwise barren soils is due to the free circulation of lime carbonate through natural agencies, such as vegetation. It is extracted from carbonated waters and distributed through the soil in the organic remains. Common limestone is that which is used in rubble and ashlar work, and for burnt lime. It is an essential in all kinds of masonry. Hydraulic lime is the kind which, when burnt and mixed in mortar, hardens under water. As a fertilizer, lime releases such essential elements as potash, ammonia, and magnesia, which would otherwise remain locked up in the soil. It quickens the decay of vegetable matter, converting it into true humus. Soils rich in lime resist wet weather or drouth better than corresponding soils lacking it. It makes soil easier to cultivate. On sandy soils it prevents burning

of crops. It corrects acidity common to low wet places. It destroys insects and fungi. In fact, it is used to correct or prevent smut in corn and "club foot" in turnips. Pure white lime is used for whitewashing. Chalk is made into common whiting, Spanish whiting, gilders' whiting, Paris white, and prepared chalk drops. This whiting is used principally for calcimine, but it is also employed in the manufacture of putty, rubber, oil cloth and glazed wall papers. All the chalk in America is imported, while great beds of it lie undeveloped in Arkansas. It is in use in laboratory work, and in pharmacies.

Slag Utilized. Another and valuable use is found in its adaptability as a furnace flux, necessary for reducing iron ore to a metallic state. Greater care in its selection is used now, since the slag formerly considered as a waste product, is being used in many ways. This slag is used for cement, sand, brick, glass, railway sleepers, paving material and the like. It enters into almost all varieties of glass, except flint and crystal. It hardens glass. Lime glass cannot compete with lead glass in brilliancy. But it is harder, not so easily scratched, holds polish longer is more elastic—hence tougher, stands higher temperatures, resists the action of water and chemicals and is more cheaply produced. Glass, rich in lime, is preferred by the consumer, but not by the producer. Used in plate glass, it makes it harder to polish, but it holds the polish longer and better.

Plant Features.

In going through the Batesville white lime plant, a lot of things arrest attention. The burnt lime is screened, as we have said. The largest pieces go for road ballast, the next grade for fertilizer, the next into a stock food formula. Scientists agree that it is easy to meet the calcium need, by using a powdered form of lime, added to the feed. The very finest of all goes into correcting the acidity of sugar cane. So, your morning syrup, a very refined product of your fields and your mountains. A ramble through the plant takes one past the automatic bagfillers. Each bag holds exactly 50 pounds as the last ounce goes in from the big hopper, a little gadget suddenly stops the flow, and the attendants removes the bag, and replaces it with an empty one. Some of the bags are much larger than others, but each holds just 50 pounds. The larger bags were used for hydrated lime, which weighs less than that which has not been treated.

There are only two plants of the kind in the state: Limedale, at Batesville, and the one at Fayetteville.

Wide Usage For Limestone Anticipated

Gazette 1-16-38

State Geologist George C. Branner said yesterday that a project approved by the WPA Friday for drilling test holes in Pulaski county to ascertain limestone deposits would uncover an unlimited quantity of limestone which could supply Arkansas's agricultural needs for years to come.

He based his assertion on a preliminary survey made by the Arkansas Geological Survey in 1936.

The WPA office in Washington allotted \$3,936 to the Arkansas Geological Survey for the work. The number of certified WPA workers to be employed in the project and the time for starting will be worked out by the state WPA office.

Mr. Branner said the preliminary survey revealed limestone beds as much as 51 feet thick along a 14-mile stretch from Little Rock to Bauxite. In most instances, he said, the beds are near the surface and would permit open pit quarrying. He said tests of samples disclosed a percentage of 85 per cent carbonate lime.

The state geologist said it would be necessary only for the lime to be crushed to be used for agricultural purposes in supplying soil deficiencies. The limestone also could be processed and be used in plaster work.

He said crushed limestone sold for \$1.25 per ton f. o. b. Little Rock and that limestone delivered in the state sold for \$3 per ton. The nearest limestone deposits to Little Rock are at Batesville.

Cheap Limestone Proposed. Rejected Without Trial. Gazette 1-23-38

The 1937 legislature, apparently unknowingly, prevented the state of Arkansas from entering into the business of mining and selling limestone to farmers of the state in open competition with private enterprise.

The discovery came to light in research work in connection with a WPA project for drilling test holes in Pulaski

county to determine the extent of limestone deposits. Twelve workers will start work on the project within two weeks, financed with \$3,936 in WPA funds.

Act 128 of 1923 authorized the state Penitentiary Board in co-operation with the state geologist to establish one or more stations manned by convict labor for the purpose of crushing limestone for agricultural purposes which would be sold to the farmers of the state at actual cost.

"The Penitentiary Board are empowered to acquire by purchase or gift suitable deposits of limestone and in sufficient quantities to provide a supply for a long period," the act said.

"When the construction of said plant or plants is ready to begin, the board shall call or summon a certain number of able bodied male convicts, not to exceed 100 for each station for the purpose of building and operating the same."

"The product from these stations, or station, shall be sold to the people of the state of Arkansas at the actual cost of all expenses connected with the crushing and loading of same upon the cars."

This measure apparently had been forgotten in the shuffle of succeeding legislation since no known attempt was made to take advantage of its provisions.

Moved apparently by agitation created by the possibility of goods manufactured at the state penal farms being sold to the public, the 1937 legislature passed Act 98 which made it unlawful to offer for public sale products manufactured, produced or mined by convict labor, however, may be used at state tax-supported institutions, which would make it possible for limestone mined in Pulaski county to be used on lands of state-supported institutions.

State Geologist George C. Branner said preliminary report made by the Arkansas Geological Survey in 1936 revealed limestone beds as much as 51 feet thick along a 14-mile stretch from Little Rock to Bauxite.

Drillings will be made to a depth of as much as 15 feet with a specially devised rig. Mr. Branner said the preliminary survey indicated there was an unlimited supply of limestone in the area which would supply south Arkansas's agricultural needs for many years.

NOTES OF THE DAY. Gazette 2-6-38

A satisfactory chemical substitute for rubber, made of four common and plentiful raw materials, is being worked out by government and industrial chemists. Its component parts are coal, salt, limestone and water, and since there can never be a domestic shortage of these, its use would do away with the necessity of importing. The substance is called neoprene. The first step in its manufacture is to make calcium carbide out of coal and limestone. When water is added the calcium carbide gives off acetylene gas which, with the addition of a catalyst, produces a gas called monovinylacetylene. Then hydrochloric acid, made of salt, is added, resulting in a liquid known as chloroprene which, through the union of its molecules, becomes the rubber-like neoprene. Neoprene is said to be as tough and elastic as rubber, and does not deteriorate when exposed to gasoline, oils, oxygen, sunlight and heat. Though its original cost is greater than that of rubber, it is said that the longer life will more than compensate.

Calcium Carbonate Deposit Found in Sharp County. 4-3-38

Special to the Gazette. Evening Shade, April 1.—An extensive deposit of calcium carbonate, used as a fertilizer, has been found near Sitka, Sharp county. It is said that arrangements have been made for mining it, and that a large crew will be used in working the deposit.

The colors of the limestone are many, a few of which are pure white, blue, grey, tan, black, brown, yellow and greenish.

Black marble, used in mosaic work, a very rare form of limestone, is found in Independence county, near Batesville. The rarest of all varieties, lithographic rock, unusually valuable, is present in considerable quantity in Izard, Marion and Searcy counties. All in use at present is said to be imported from Bavaria. The deposits in Arkansas have never been touched.

Common limestone is used in all cobblestone or rubble work. This material is now being used throughout north Arkansas. Hundreds of dwellings and business buildings are made of it. Home owners are making fences of it. Artistic effects in color and arrangement may be achieved with it. Lime is essential in all kinds of masonry. Hydraulic lime is used in cement for masonry work beneath the surface of water, as in bridge piers and foundations.

Extent of Deposits Unknown. The depth and extent of the Limedale, Independence county, deposit is unknown. It is said that a well, put down 135 feet through hard, white limestone, failed to "touch bottom" of it. The land on which the well is located is separated from a similar deposit by a high ridge in what was a part of the original Spanish land grant. Even in early days the value of the Independence county deposits was realized by a

ENORMOUS ARKANSAS LIMESTONE DEPOSITS STILL UNDEVELOPED

By CARUTH S. MOORE. Special to the Gazette. 5-22-38

Evening Shade, May 14.—Although

north Arkansas is rich in limestone deposits, there are only two commercial plants in the state for converting this into lime and its valuable by-products. These are at Limedale, near Batesville, and at Fayetteville.

Handicapped by lack of capital and by poor transportation facilities, residents of section where the limestone is found have hardly realized its value.

Geologists say the stone is the remains of a prehistoric shoreline which extended from northeast to southwest Arkansas across the center of the state. The limestone outcrops at Grandglaise in Jackson county and at Bradford and Russell in White county. The outcrop appears again in south Little Rock and Mabelvale in Pulaski county, and again at Bauxite and Benton in Saline county. The same shoreline is said to extend southwestward from Saline county.

Uses Outlined.

The best known use of lime is for fertilizer. As such it releases such valuable elements as potash, ammonia and magnesia, which would otherwise remain locked up in the soil. It quickens the decay of vegetable matter, converting it into humus, a soil and plant food. On sandy land lime helps prevent burning of crops in dry weather. It "sweetens" wet or acid soils. It is absolutely necessary for the germinating of alfalfa. It destroys insects and fungi. It prevents "smut" in corn and wheat. It makes the land easier to cultivate. The fertility of many otherwise barren soils is due to the circulation of lime carbonate through natural agencies.

Lime or "marble dust" is used in the manufacture of carbonated drinks. A fine, flour-like compound made by kiln-burning limestone is used in sugar making. A coarser form goes into stock and chick feed, a still coarser is used as fertilizer, and the coarsest makes railroad ballast and road materials.

Pure white lime is used for whitewashing. Chalk, a form of limestone, great beds of which are lying untouched in Arkansas, is made into various forms of whiting. Whiting is used principally in the making of calcimines and paints, but is also essential to the manufacture of putty, glazed wall paper and other papers, rubber, and oil cloth. Much is used in laboratory work and in pharmacies.

The slag from lime kilns is used in reducing iron ore to a metallic state. The slag is used also in cement, brick, glass and paving materials. It is put into almost every kind of glass, except crystal. It hardens glass, and while lime glass cannot have the brilliancy of lead or "cut" glass, which a decade ago was seen on every "sideboard" and china closet, it is harder and more economical. It holds a polish longer, is resistant to heat and chemical action, and is more cheaply produced. Used in plate glass, lime makes it hold its polish longer. Almost all chalk used in whiting is imported, while vast quantities of it lie unnoticed and undeveloped in Arkansas.

Lime is necessary for the development of all plant life. Potatoes are nearly half lime. Most of it is produced directly or indirectly through the agency of some sort of plant or animal life. Limestone deposits at St. Joe contain thousands of specimens of shellfish, fossilized creatures which once swam or lived in the great inland sea which covered this part of the United States, and fronds of great marine ferns. The St. Joe marble is a distinct variety. There are five or six other varieties found in north Arkansas alone. These include St. Clair marble, grey limestone, Batesville white limestone, and Izard limestone.

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Common limestone is used in all cobblestone or rubble work. This material is now being used throughout north Arkansas. Hundreds of dwellings and business buildings are made of it. Home owners are making fences of it. Artistic effects in color and arrangement may be achieved with it. Lime is essential in all kinds of masonry. Hydraulic lime is used in cement for masonry work beneath the surface of water, as in bridge piers and foundations.

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few people. Dr. J. F. Allen burned lime in a kiln, and shipped large quantities. A little was shipped to England. About six miles east of Batesville was the old Jones kiln.

A lime making plant is interesting to visit. Limestone burning throws off flames of every color in the spectrum. They rise luridly yellow, red, purple and green.

The plant at Limedale, six miles northwest of Batesville, has six kilns. The kilns burn more than 40 cords of wood a day when the firing is at full capacity. Cutting and selling the cordwood to the plant forms a lucrative business for farmers and landowners.

An elevated railroad running from the quarry, where the limestone is dug out of the cliffs, carries the stone to the top of the kilns, and dumps it in. There it is burned four hours. Then the kilns are opened, and the red hot stones are dropped into barrows, which remove them. They are hauled to different parts of the plant and ground into varized fragments.

The main building at the plant is 500 by 100 feet. In addition to the kilns there are huge storage tanks for the lime. Nearly all the machinery is operated by electricity. The plant has been operated for many years. A model village houses workers.

There is a large deposit on Lafferty's creek, several miles from Limedale. A quarry was established there many years ago and several thousand dollars was invested in machinery for digging and crushing, but the plant was abandoned.

Lime is put into bags at the Limedale plant, that hold exactly 50 pounds by an automatic process.

A Few Facts.

The sugar you put on your breakfast cereal and into your coffee, if it is made from sugar cane, has probably been alkalinized by the addition of a fine grade of lime. Likewise corn and other commercial syrups. Each vegetable you eat, leafy or starchy, contains a high percentage of lime. The glass you drink from likely has lime slag in it. So have your window panes and automobile glass.

Geologists Inspect 'Rockwool' Industry at Batesville.

Special to the Gazette. 6-16-38

Batesville, June 15.—Dr. George C. Branner, state geologist, and R. C. Beckstrom, supervisor of a state-wide mineral survey, conferred with eight county supervisors in north Arkansas here today. Supervisors were William G. Rinehart, Batesville; Hardy Nash, Salem; George F. Wiegart, Mountain View; Eldridge Smith, Melbourne; Everett R. Bowman, Black Rock; E. E. Mitchell Jr., Mountain Home; Lytell McElroy, Pocahtontas, and Calvin B. Whitney, Hardy.

Te officials visited the Batesville white lime quarry this afternoon to witness a demonstration in making "rockwool."

An area of 1,170 square miles has been covered thus far in the immediate eight counties, with approximately 110 men engaged.

State Geologist Visits Quarry near Batesville

Batesville—State Geologist George C. Branner and R. C. Beckstrom, supervisor of the statewide mineral survey, yesterday visited the Batesville white lime quarry to witness a demonstration in making "rockwool."

The statewide survey already has covered eight north central counties, comprising about 1,170 square miles. Approximately 110 men are engaged in the survey.

EXPERIMENTS IN ROCK WOOL MAKING AROUSE GEOLOGICAL INTEREST

Special to the Gazette. 6-26-38

Cotter, June 25.—If chemists ever develop a formula for putting fiber and strength into rock wool, that would make it adaptable for weaving and wear. North Arkansas, doubtless would be able to furnish raw material for millions of yards of cloth annually, for there are literally millions of tons of dolomite and magnesium limestone, from which rock wool is manufactured, in the territory. Imagine picking up a 20-pound boulder, throwing it into a cupalo and converting it into enough cloth to make a suit of clothes. That is not possible now, but chemists are working on it.

The first Arkansas rock wool was made as an experiment in the White River country last week. Whether manufacture of the product will become an industry in this section is yet to be seen, however.

One of the essentials in the manufacture of rock wool is coke, and it has

to be shipped here. It takes a ton of coke to produce a ton of rock wool. Another essential is a well balanced rock. To date no perfectly balanced stone, chemically, has been found in the United States. Recent reports have indicated, however, that stone has been found in Canada that is perfectly balanced.

A chemically perfect stone for the manufacture of rock wool should contain 26 per cent silica, 14 per cent alumina, 16 per cent calcium, 10 per cent magnesia and three and eight-tenths per cent iron, chemists say.

Rock wool is produced under a terrific heat. The raw stone is placed in alternate layers in a cupalo with coke, and the charge fired under a heavy blast and brought up to a temperature

of approximately 3,000 degrees Fahrenheit. It melts at this temperature and as it pours from the cupalo, a jet of steam under high pressure strikes it converting it into wool. The force of the steam carries it into an adjoining section or storage room, as its chemical form is changed. Magnesia is necessary in the rock because it is combustible.

Much Stone Available.

Magnesian limestone from which rock wool could be manufactured occurs in many North Arkansas counties. It is present in Izard, Stone, Marion, Baxter, Fulton, Boone, Searcy, Newton, Benton, Washington and others. In a report by the late John C. Branner, as state geologist, on these limestones, he said: "The principal varieties of the magnesian limestones in North Arkansas, are light gray, almost white, cream colored, and a dark gray becoming almost black in places. The last variety is highly silicious and is charged with carbonaceous matter which gives it its dark color. The gray and cream colored varieties are important from an economic standpoint, as excellent building stone of both colors is obtained at various places over the area."

There were a number of large magnesian limestone quarries in North Arkansas back in the 'nineties, before the use of cement became so popular. The stone was shipped to nearby cities for use as flagging, curbing and sewer caps. Many buildings at Eureka Springs that are still standing were constructed from this material.

The chemical properties of these stones lack certain of the necessary elements for a perfect stone for the manufacture of rock wool, but they contain the essential ones. Several types run as high as 24 to 40 per cent magnesia, 32 to 48 per cent calcium, and 13 per cent silica, with no alumina. Used for Insulation Now.

Rock wool is being used now largely for insulation purposes. In summer, houses insulated with it are cooler, and in winter, warmer. It appears to have the characteristics of the raw material from which it is made. Did you ever notice the difference in temperature in the summer time when you walked into a stone house? It is the heat resisting stone walls that make the difference.

A man familiar with the manufacture of rock wool said here recently: "Most any limestone rock that contains silica and magnesia will produce rock wool, but not at a profit. If the essentials are not present in sufficient quantities they have to be added, and this increases the cost of the product. Fuel, too, is one of the principal items of overhead. It takes about a ton of coke to produce one ton of rock wool. About the best that has ever been done, where the conditions were excellent and the rock was rather well balanced, was one ton of wool from 1,800 pounds of coke. "The cupalos in which the rock is fired are rather expensive to keep up

and this adds to the cost. Then there is the cost of labor at the plant, quarrying and getting the rock to point of manufacture, all of which adds to the overhead. Color, too, is an important quality in the product. It should be a pearly white. Foreign substances in the stone might affect the color. An uneven heat also affects it. While the color does not affect the quality of the wool, a clean, white, pearly product just naturally sells better than a dark off-shade."

It is possible that a thorough search for a balanced stone in North Arkansas would disclose a perfect stone for the manufacture of rock wool. While the metallic minerals and commercial stones have been given a rather thorough going over by geologists, the magnesian limestones and dolomites have not been examined so carefully. It is hoped that mineral surveys which are being made now may discover a stone valuable for the use.

Any plant manufacturing rock wool in North Arkansas would have a favorable market arrangement, as none is being made now in the South.

Lime Bearing Clays Found In St. Francis County.

9-4-38

The Arkansas Geological Survey's mineral survey of Arkansas, being conducted by WPA workers, has uncovered large deposits of lime-bearing clays—including huge fossilized oysters—in Crowley's Ridge in St. Francis county, George C. Branner, state geologist, reported yesterday upon his return from an inspection of the work in Poinsett, Craighead and St. Francis counties.

Dr. Branner said discovery of the deposits was considered an important item, because soils in that vicinity are greatly deficient in lime, and it has been necessary in the past to "lime" farm lands with products hauled great distances.

Other important results of the survey to date were cited as: Mapping of vast deposits of sand and gravel—which was hailed by county judges of the areas as an important asset to campaigns to secure road materials.

Many clays were uncovered in Poinsett county.

Other discoveries in Craighead county included ochre, paint rock, clays, quartzite—which is the hardest rock found in the area, and is suitable for building material—Fuller's earth and lignite. Lignite and clays were found in St. Francis county.

Directors of the work in the counties are Poinsett, I. W. Merritt; Craighead, H. A. Nash; St. Francis, Lewis Bohlinger.

North Arkansas's First Rotary Lime Kiln Installed.

Special to the Gazette. 9-11-38

Guion, Sept. 10.—Edgar Baker of Batesville is installing a new rotary lime kiln at the St. Clair Marble Company's quarry five miles south of Guion on the White River railroad.

The kiln is the first of the rotary type to be installed in north Arkansas. It is about 90 feet long and six feet in diameter and will have a capacity of 100 tons of burned lime a day. It will be fired with crude oil.

There is an immense pile of waste now on the dump below the marble company's quarry which will be utilized first. When this is consumed quarry operations will be started to supply the kiln. A big tonnage from the new plant will be marketed at Southern paper mills. Cheaper operation and larger production are claimed for rotary kilns.

DRILL FOR LIMESTONE.

Supervisors of the state WPA mineral survey began work yesterday directing drilling at the State hospital's Benton unit for limestone. George C. Branner, state geologist, said yesterday. A small crusher will be moved to the site and about 3,000 tons of limestone will be distributed over farms at the unit. Dr. Branner said presence of the deposits was known, through digging for wells, and that it cropped out in spots on the farms. The work will require about six weeks. 11-11-38

Pulaski Limestone Deposits Studied

A survey of limestone deposits in a 14-mile-long area extending from Mabelvale to Bauxite will be resumed by the state geology department within a short time. Dr. George C. Branner said, yesterday.

His statement followed an announcement from Washington that an allotment of \$3,936 from WPA funds had been approved for the work.

A preliminary survey of the territory was made in 1936, showing that vast lime deposits are located in the area. Additional test holes will be drilled to determine where the largest deposits are nearest to the surface and the advisability of placing shallow pit mines.

Dr. Branner said the preliminary tests revealed limestone deposits up to a thickness of more than 50 feet. The limestone, he said, tested up to 85 per cent calcium carbonate lime.

Rock-wool May Be Produced

Gazette 8-25-39

Williford Has Abundance of Material, May Revive Industry.

Williford—The resurrection of a now dead industry is envisaged by progressive citizens of Williford, 10 miles east of Hardy, who see in a comparatively new product an opportunity to bring the town back to its former position of one of the leading industrial communities of north Arkansas. The section is abundantly endowed by nature with raw materials for the product. That product is rock-wool, a light, fluffy insulating material made from a type of stone which abounds in this hill section. It is a material

which is fast gaining favor with contractors and builders. It is manufactured by melting down the rocks and then blowing the liquid through a high-pressure gun.

At places where the rock-wool is now being manufactured it is said that a large part of the native rock is unfit for this purpose, but tests of the stone around Williford indicate that more than 90 per cent is ideally suited for manufacturing purposes. In that class is a 100-foot hill of the stone at a quarry formerly operated by a Memphis concern, which 15 years ago had a large quarry and stone crushing plant at Williford.

A decade and a half ago the quarry and crushing plant were operating night and day shifts, and employing crews of from 100 to 200 men. The product was shipped all over the South. With the establishment of other plants where freight rates were more favorable, production was slowed down until now only a few cars of rough building stone are shipped each month, and the crew of 200 has dwindled to two watchmen. Most of the machinery in the plant has been junked and the main buildings are so deteriorated as to be practically useless. The company part of town, which contained homes for the employees, is practically gone, only a few of the 75 homes which formerly stood there being fit for habitation.

But the citizens of Williford, headed by Mayor Ben N. Yates, who are now forming a company for the manufacture of the wool from their supply of raw material, hope to see a larger industrial town rise from the ruins of the former plant.

They believe that the new product will bring to the community a pay roll that will exceed that of the most prosperous quarry days and again transform the town from a strictly agricultural community to an industrial center, and that the high percentage of usable stone will by far off-set any advantage other points may have by virtue of lower freight rates.

Lime Plant Near St. Joe Assured

1-29-40

Harrison, Jan. 28.—Establishment of a lime plant, which will produce several hundred carloads of agricultural lime annually and for which a market of approximately 200 cars annually has been found, will be placed in operation near the Missouri and Arkansas railway tracks north of St. Joe soon. L. A. Watkins, president of the road, announced yesterday.

William S. Brantingham and H. J. Wilkinson, operators of the Lime Products Company, which has plants near Fayetteville, Berryville and Green Forest, are considering the new project.

Deposits of limestone said to be as rich in lime as any on the continent have been uncovered between St. Joe and Pindall along the railroad, Mr. Watkins said. Fifteen years ago one of the section's largest commercial lime plants with two large kilns was operated a mile north of St. Joe and later a plant also was installed for producing hydrated lime.

Development of the agricultural lime product has been contemplated for some time, Mr. Watkins said, and if the Lime Products Company fails to establish a plant in the area, a plant will be established by the Manda Industrial Corporation, headed by Mr. Watkins, and formed to obtain and investigate new enterprises for the railroad.

A survey of the delta section traversed by the railroad recently was completed by Mr. Watkins and his assistants. It indicated a substantial market for the product to be used on delta farms, with a minimum demand of 200 cars annually. After the agricultural lime plant is established, it will be expanded into a commercial lime plant, with kilns and other equipment, Mr. Watkins said.

Buying of Feeds Within State Planned.

Mr. Watkins also reported that his survey showed that the delta region along the Missouri and Arkansas railway from Helena to Heber Springs ought to furnish corn, hay and cotton seed products for the roads' territory from Heber Springs to Eureka Springs.

Helena markets now can supply 100 carloads of shelled corn in this area, the survey indicated. Corn and hay have been marketed in the northern states the past few months, and the survey shows that these products could be supplied to this section instead from the delta region.

Mr. Watkins said that the railroad will undertake to make a rate on these intra-state shipments on its

lines which will permit movement by rail. Consumers along the line will co-operate in the plan, assuring them lower prices than they have been getting and also keeping the money in Arkansas, Mr. Watkins said. Promotion of the plan will be established through feed dealers.

Limestone Plant Assured Good Market

2-11-40

Special to the Gazette.

Pocahtontas, Feb. 10.—So extensive

has been the demand for the agricultural lime produced at the Lawrence County Limestone Company plant between Black Rock and Imboden, that orders already on hand are sufficient to keep the plant running for several months, operators reported today. The business grew out of the demand of Randolph, Lawrence and Sharp county farmers for a supply of limestone near home with which to "sweeten" their soils.

"Souring" of the soil in many of the hill sections in these counties had made production unprofitable, and the farmer who wished to improve his soil and crop production had to ship the ground limestone for great distances. For all but the most prosperous farmers the high freight rates made this impossible.

The new plant is running full time. It consists of a large hammer mill and a 40-horsepower boiler and engine to furnish power for the mill and supplying tramway. The plant has a capacity of about 30 tons daily. The fuel is taken from the nearby timberland and is a source of extra income for several farmers in the neighborhood.

The quarry from which the stone is taken is about 150 feet behind the plant and the stone is blasted and dug from the hillside and then hauled on a tramway to the hammer mill.

Lime Kiln Near Guion In Good Test Run.

2-11-40

Guion, Feb. 10.—Edgar Baker, head of the St. Clair Lime and Material Company, which operates a new type lime kiln, two miles south of here, has just completed a 40-ton test run, and produced a fine batch of lime. The unit is a rotary kiln, 110 feet in length and six feet in diameter, and is fired with crude oil. It is the first of its kind used in this section. It has a capacity of 75 tons every 24 hours. The concern owns 376 acres bordering on the White River Division of the Missouri Pacific. The plant is located so that cars can be loaded by a loading chute direct from the bins.

1,100 FARMERS BEING SUPPLIED BY LIME PLANTS

Three Operating, Fourth Planned.

2-25-40

Special to the Gazette.

Berryville, Feb. 24.—The Lime Products Company, under the management of W. S. Brantingham and sponsored by the Soil Conservation Service, during the last year has furnished ground limestone to 1,100 farms in Northwest Arkansas for soil betterment purposes. The product is sold delivered to the farmer for \$2 a ton.

Berryville Plant Largest.

The concern is operating one big plant, with 100 tons daily capacity, two and a half miles east of Berryville, and has two other plants, one near Huntsville in Madison county, and the other at Johnson in Washington county. The plant near Berryville is the largest of the three.

Because of the Boone limestone, or Batesville marble, is exceedingly high in calcium carbonate, it is especially adapted for the manufacture of this chemical. Most of it runs 99 per cent.

Strong Demand for Feed.

The product is in strong demand by feed manufacturers. Livestock grown in a limestone country grow a better and larger bone frame. Animals in such sections get this ingredient from the grass and other forage they eat and from the water they drink. Animals raised in a section that has no limestone do not develop as good bone frame, and calcium car-

The equipment at the Berryville plant consists of a jaw crusher with a capacity of 100 tons a day. The large boulders are broken to about egg size in this machine, and then are passed through a hammermill, which reduces them to fines. Seventy per cent of the product is reduced to minus 10 mesh and 30 per cent to minus 100. A big quarry near the plant supplies the raw material. The limestone used in the manufacture of this ground limestone is rich in calcium carbonates and magnesia carbonates, and produces a product ideal for soil betterment in this section.

The farmers in northwest Arkansas are using an average of two tons of ground limestone to the acre in bettering their meadows and pastures and are getting excellent results.

Another Mill Planned.

Mr. Brantingham said that he expects to install another plant, somewhere on the M. and A. railroad, in this section, and ship the product manufactured by it to counties farther south.

Machinery Being Made For Lime Mill

For Lime Mill

5-12-40

Special to the Gazette.

St. Joe, May 11.—Machinery for a new lime plant at Mercer, between St. Joe and Pindall on the M. & A. railway, is being manufactured by the Steel Manufacturing Company at Ottawa, Kan., and will be ready for installation within a few weeks, L. A. Watkins, president of the M. & A. railway, announced.

Crushers will be installed at the large bluff of almost pure lime, and machinery will convey the product from the crusher almost directly to freight cars on the siding. The lime plant is located on land owned by L. R. Gulley and is being installed by L. R. Brantingham.

Agricultural lime, for which there is a great demand in the delta region traversed by the eastern half of the M. & A. railway, will be the first product to be manufactured. Later if there is a demand, a kiln will be installed and lime for masonry and mechanical purposes will be produced. The first machinery to be installed will have a capacity of 200 tons, or four carloads daily, Mr. Watkins said.

The limestone deposit is almost inexhaustible and adjoins phosphate deposits recently uncovered, the extent to be determined. Plants for preparation of the phosphate rock for fertilizer mixtures probably will follow installation of the lime plants. Large deposits of phosphates have been uncovered on lands of W. P. Campbell, adjoining the Gully land.

Mr. Brantingham is identified with the Arkansas White Lime Company, operators of a plant at Johnson, near Fayetteville, and also has plants at Berryville in Carroll county and one near Huntsville in Madison county. The plant at Berryville is the largest of the three in operation.

Calcium Carbonate Market Grows

6-23-40

Special to the Gazette.

Limedale, June 22.—Calcium carbonate is becoming one of the important rock products of north Arkansas. The Batesville White Lime Company here shipped 250 carloads of this product last year, and the market is holding up well this year. Calcium carbonate has three important uses in industry. It is used as a mineral supplement in feeds, to polish rice in rice mills, and for waterproofing the surface of higher type asphalt roads.

Because of the Boone limestone, or Batesville marble, is exceedingly high in calcium carbonate, it is especially adapted for the manufacture of this chemical. Most of it runs 99 per cent.

Strong Demand for Feed.

The product is in strong demand by feed manufacturers. Livestock grown in a limestone country grow a better and larger bone frame. Animals in such sections get this ingredient from the grass and other forage they eat and from the water they drink. Animals raised in a section that has no limestone do not develop as good bone frame, and calcium car-

bonate is a necessary ingredient in the feed they eat. For this reason it is included in the mix in all manufactured mixed feeds. Many bottom farmers, who raise cattle and grow their own feed, come direct to the plant here in trucks to get the calcium carbonate, which is put up in 50 and 100-pound bags. They dump it loose in the feed troughs, and the animals eat what they need as they eat salt. The average content in mixed feeds is approximately two per cent.

Calcium carbonate is especially adapted to polishing rice. It gives the little white grains a clear, smooth, glossy surface. The bran and other residue from rice mills is utilized for feed, and with the calcium carbonate already in it, none has to be added.

Lime Plant To Be Located Near Everton

9-8-40

Special to the Gazette.
Everton, Sept. 7.—An agricultural lime grinding plant will be established one and a half miles northwest of Everton, Boone county, by the Lime Products Company, incorporated by Harvey Jack Wilkinson and W. S. Brantingham, both of Fayetteville, L. A. Watkins,

president of the Missouri and Arkansas railway, announced.
Construction of the plant will be started immediately and a survey is being made for laying a spur track from the main line of the Missouri and Arkansas. The plant will have a capacity of 150 tons of agricultural lime daily and from 15 to 20 men will be employed. Operations will start immediately after installation of the machinery.

Increased Demand For Lime.
Soil conservationists and agricultural extension agencies have urged the use of limestone to promote the growth of legumes and already there has been a demand for the lime in restoring sour lands in the delta region traversed by the railroad.

Establishment of the plant will be of great value to farmers, who are asking for cheap lime and are being assisted in buying it by AAA payments. Mr. Watkins said. Farmers can now be assured of a limitless supply, and as the demand increases, the capacity of the plant may be increased with installation of additional equipment.

The plant originally was planned to be erected on a site between St. Joe and Pindall in Searcy county, but a lease was not obtained on the proposed site, and the location was changed.

AAA Creates Demand For Agri Lime

10-14-40

Special to the Gazette.

Batesville, Oct. 12.—The soil improvement program now being sponsored by AAA has resulted in widespread use of agricultural limestone in all section of north Arkansas, and more of this product now is being produced in the northern part of the state than any other stone product.

The Batesville White Lime Company, which operates a large plant at Limedale, has a production of 50 tons per day. This is exclusive of its production of calcium carbonate and other crushed stone products. Under the present setup agricultural limestone is shipped by railroad to the buyer's nearest railroad station, or delivered by truck in five-ton lots direct to the buyer's farm. Good highways and county roads have made this product accessible to practically every farm in the state, and it is being used widely. It is particularly beneficial to all cover crops, and cover crops are a part of the soil erosion control program in the hill section of the state.

Well Adapted To Use.
Because of its high calcium content, north Arkansas limestones are well adapted to the manufacture of agricultural limestone. Properly equipped plants can produce it very economically. The base price at the plants is \$1.50 per ton. The truck-delivered price depends on the distance it has to be hauled. The manufacturing is a crushing and screen process. The chunk stone first is passed through a large gyratory crusher, which reduces it to egg size. From there it goes through a hammer mill, which pulverizes it. Then it goes into a rotary screen, which screens it to 10-mesh size. It then is ready to apply to the soil.

Limestone Has Been Worth \$10,743,850.

Gazette 2-23-41

Arkansas's limestone and marble fields, a rectangular area embracing 7,000 square miles, produced \$10,743,850 worth of products between 1889 and 1939, inclusive, Dr. George C. Branner, state geologist, reported in a 25-page booklet on "Limestones of North Arkansas," issued yesterday.

Bulk of this production was of limestone which, made into lime and sold to lime burners, had a value of \$6,903,510. Crushed stone for road material and concrete had a value of \$1,078,969, while marble, including dimension and terrazzo, was valued at \$332,466, Dr. Branner reported.

Highest production was reached in 1930, when all products sold for \$626,259. The 1939 production was \$417,193. Black marble production from 1930 to 1939, inclusive, was reported at 35,278 cubic feet of dimension black marble and 3,323 short tons of terrazzo, with an estimated value of \$85,308. The figures are based on severance tax returns.

The booklet points out that the field is traversed by 7,000 miles of railroads and 1,200 miles of surfaced highway, with natural gas and power in the east and west portions of the field.

Dr. Branner reported that the field's reserve of limestone practically was unlimited, being estimated at three billion short tons.

Limestone Deposits Near Little Rock.

Gazette 3-11-41

Promising deposits of limestone of the Tertiary age have been located and surveyed in Pulaski and Saline counties by the state Geological Survey, Dr. George C. Branner,

state geologist, reported to Governor Adkins yesterday.

The two areas of "especial promise" reported by Dr. Branner are located near Alexander and southwest of Mabelvale. The deposit near Alexander is estimated to contain 2,075,000 tons and the one southwest of Mabelvale is estimated to contain about 2,250,000 tons. Dr. Branner said.

"It is believed the principal use to which this limestone can be put is for supplying lime for the lime-deficient soils in central Arkansas," Dr. Branner said. "Its economic importance depends in great measure on whether or not it can compete successfully with the higher-grade limestone from northern Arkansas."

Gazette 3-23-41
LIMESTONE SURVEY BEGUN.

Because of heavy industries' increased demand for high-grade limestone, Dr. George R. Heyl, assistant state geologist, is investigating deposits in northern Garland county. Limestone is used in cement and other materials. Central Arkansas has no high-grade limestone, Dr. George C. Branner, state geologist, said. The state's high-grade deposits have been found in the Batesville and other Ozark areas.

Agricultural Limestone In Big Demand

Special to the Gazette. 4-6-41

Batesville, April 5.—Agricultural limestone from this section is in stronger demand this spring than any previous spring, and a large tonnage is being manufactured daily by the Batesville White Lime Company, which operates a big plant at Limedale.

Its production is running from 70 to 80 tons a day and it is practically all being taken as fast as it comes from the pulverizers. Farmers both in the hills and the bottoms are waiting up to the value of ground limestone for sweetening sour land.

Bottom counties are taking about three-fourths of the production, and the hill counties, one-fourth. A large part of that going to the hill counties is going to Fulton and Izard counties. Most of it is being used to sweeten pasture land, though some is being used on cotton land.

The Batesville White Lime Company is operating six trucks in making deliveries, and a big tonnage also is being shipped in car lots over the Missouri Pacific.

Zinc-Lime Mill Planned At Black Rock

Special to the Gazette. 6-1-41

Black Rock, May 31.—S. M. Neeley of Memphis, Tenn., who owns 628 acres of mineral land and mineral rights in this section of the Calamine field, will install a dual mill this summer. The mill will produce ground limestone and also mill and concentrate lead and zinc ores. It will be located at Shaft No. 1, near Black Rock, on the outskirts of Black Rock, Lawrence county.

Mr. Neeley has been the leading operator in this section for many years and has opened up some good deposits of disseminated lead and jack, and some large deposits of white and yellow spar that are rich in lime values. The spar has been encountered in open ground in drifts driven from the shafts.

A dual plant must be of intricate design to be adaptable to both uses. Limestone will be passed through the crusher and rolls and other pulverizing machinery and come out a finished product. Crude ore will pass through the same process over the same machinery, but will continue on through the jigs and other concentrating equipment, which will separate the minerals from the milled rock.

Three Shafts Sunk.
Shaft No. 1 has been sunk 285 feet, with the largest drift 55 feet long and 35 feet wide. Two shorter drifts also have been driven. They produce disseminated jack and some lead. Shaft

No. 2 was driven 147 feet down. At the 103-foot level a drift has been driven 175 feet, and a 45-foot drift has been driven at the bottom. Shaft No. 3, located near No. 2, has been sunk 45 feet, and a 50-foot drift from it carries some ore in the face.

Lead and zinc ores have been mined in small quantities in the Calamine field for nearly 100 years. The first mining of consequence was done in 1857, when the second zinc smelter west of the Mississippi river was constructed there. The smelting was done with charcoal made from oak timber. The foundation of this pioneer plant still can be seen at Calamine.

The field has 30 new and old prospects, approximately 20 being in Lawrence county and the remainder in Sharp.

Lime Deposits In State Vital To U.S. Defense

Mineral Is Used In Converting Bauxite Into Aluminum

Democrat 8-10-41
Whether Arkansas' supply of limestone will be adequate to take care of present stepped-up defense production of bauxite is a question that is being determined by WPA-sponsored exploration, aided by the Arkansas State Geological Department, in Pulaski, Saline and Hot Spring counties.

A production of primary aluminum, which is contemplated in five times the amount of that produced in 1939 in the United States, demands a like amount of the ingredients necessary to produce the aluminum and limestone is one of the vital needs in the production of aluminum.

Authorization for the limestone survey, which is a newly designed phase of the mineral survey that has been going on in the state since January, 1938, and which has already yielded valuable information with regard to coal and other mineral deposits in Arkansas, was granted last week in Washington to State WPA Administrator Floyd W. Sharp.

Work on the survey got underway Friday in Magnet Cove, near the town of Magnet in Hot Spring County. A seven-man crew, under WPA supervision, is conducting drill-hole record tests and cuttings are being sent to the state geological laboratory for analysis.

To Determine Boundaries.

It is the purpose of this survey to define the boundaries and depth of limestone deposits which have already been located in preliminary work by the state geologist and to determine a tonnage estimate of the stone in Arkansas fit for commercial use. Geologists report that a limestone of 95 per cent purity is desirable for production of alumina, although 93 per cent pure limestone may be used in the processing.

The state department has established that limestone quarries can be set up profitably only in areas that are proved to contain from five to six million tons of raw limestone. This survey will determine where it is feasible to set up these quarries.

In the past, lime, which with salt, coal and sulphuric acid is one of the basic substances in the chemical industry, like the other three, has been called upon to answer a multiple of purposes. It has been employed in the preparation of cement and plasters, as a tanning agent for leather, in gas purifying processes, in alcohol dehydrating, in the preparation of glass, for carbide for welding and as a fertilizer preparation.

With the present race for lighter-than-aircraft supremacy, it now takes even more importance in its role as an agent in the reduction of bauxite to alumina, or aluminum oxide. Aluminum oxide is the powdery substance which in turn is transformed into the aluminum metal.

Lime Becomes More Important.

In manufacturing aluminum, the raw ore, or bauxite, is extracted from the ground, dried or calcined and transformed into alumina. Another process changes the alumina into aluminum—the metal. In making this evolution, the limestone is used for preparing the raw or uncooked ore and refining it to a purer stage.

A majority of Arkansas bauxite in the past has been shipped to plants in East St. Louis for the first step in refining. From there, it has gone either to Alcoa, Tenn., or to factories in the Pacific Northwest for the final step.

Under tentative plans, which call for a \$21,000,000 alumina plant in the Benton-Bauxite area in Saline County, the shipping of the raw ore away from the state will be eliminated to a great extent, though

CENTER OF LIMEDALE INDUSTRY



LIMEDALE PLANT GROWS TO BIG PROPORTIONS IN ITS 12 YEARS

9-8-40

By LA NELL COMPTON.

Batesville, Sept. 7.—The community of Limedale, six miles northwest of Batesville, is the center of a many-sided industrial enterprise which furnishes a livelihood for many families in Independence and other north Arkansas counties. The plant, located one and a half miles from the Cushman highway, is operated by the Batesville White Lime Company, which has approximately 150 persons in its regular employ—100 on the plant and quarry force and 50 engaged in getting out cord wood.

\$500,000 Invested In Plant and Quarry.

Investment of the Batesville White Lime Company in the plant at Limedale and the quarry two and three-fourths miles away totals \$500,000. There are 2,500-2,600 cords of wood ricked up in the yards near the plant. Wood used to fire the kilns (only four of the six kilns are in use now) is cut and hauled by part of the plant force from nearby forests on which the company buys timber rights. The wood is sold at a good price. Every plant worker is expected to buy groceries and gasoline at the store, and each purchase is checked by the office and the storekeeper.

The annual pay roll usually is about \$175,000, but for 1939 it was estimated at \$125,000. The only strike at the Limedale plant lasted 60 days last fall.

The building which houses the machinery for lime production is 100 feet in width and nominally is divided into two parts. First is the kiln shed, 320 feet in length, with its six kilns each 18 feet in diameter and its thick floor-covering of lime dust, the same dust that workmen are always sweeping into great heaps. On rainy days the length of this open shed is protected by huge frames covered with galvanized sheeting. Railroad box cars stand on the tracks next to the shed to receive the lime, loaded by wheelbarrow. Daily shipments go out during its busiest season, which usually is from June 1 to November 1. "Pulverized lime" is shipped in bagfuls weighing 50 and 100 pounds and "hydrated lime" in 10, 40 and 50-pound allotments.

The second part of the main plant, not unrolled like the kiln shed, is the "crushing plant," about 170 feet in length, which contains the machinery to produce various types of lime and lime by-products. There are two crushing machines, one hydrating machine, 10 storage tanks for the burnt lime, automatic bag-fillers and screens to sift the limestuff into various consistencies. The machinery, of steel and cast-

iron, is run almost entirely by electricity.

From the quarry the large uncrushed pieces of bulk lime are loaded into small cars similar to coal cars, which run on a narrow railroad. Near the plant the railroad ascends sharply and from the top the carloads of lime are dumped into the red-hot kilns. The four-foot cord wood is fed into the four eyes of each kiln at the rate of 20 carloads a day to the kiln. To "break in" a kiln, fire is kept up in it for 48 hours and drawn off; then bulk lime is dumped in on a new wood fire to burn four hours, before the hot rock is caught in wheelbarrows underneath the kiln. Pebble lime is produced by running the burnt lime through the crushing machine until it is one-half to one and one-half inches in diameter.

The next process is that of pulverizing. By being run through the hydrating machine the dry limestone one-half inch in diameter and smaller is crushed to powder—a 300-mesh product, after it is sifted through a 300-mesh screen. Hydrated lime mixed with enough water to make a thick pulp (the drowning process is preferred here) becomes slaked lime. Quick or slaked lime is reduced to a 200-mesh product by running through a 200-mesh screen. Finally, the dry hydrated lime is run through a separator, which rids it of the discolored waste material, leaving only the white lime dust. But even the waste product is sent away to be used for fertilizer.

Bill Willis, hydrating machine operator, explained that "the only thing that's wasted here is the noise of the machinery."

Solid Limestone Found To Depth of 135 Feet.

Limestone operations began with a 135-foot well near Limedale which was drilled through solid stone. The depth of the deposit was not reached when the drilling stopped.

Quarry workers use picks and shovels, and there is one electric shovel to load the limestone into the railroad tram cars. Blasting is used to dislodge deeper deposits. The quarry is approximately 300 yards in length and 100 yards in width.

Lime Essential To Many Industries.

In addition to the use of limestone as a building material, lime, made by burning or calcining common limestone, is used in chemical industries and in mortar. Pure white lime is used for white-washing. Valuable as a fertilizer, lime

releases potash, ammonia, and magnesia in the soil and quickens the decay of vegetable matter into true humus. It aids soils to withstand the vicissitudes of the weather. It destroys insects and fungi, and is used during the summer months as poison to rid the cotton plant of worms and the cotton boll of boll weevils.

Glass is one of the many useful by-products of the slag lime, formerly considered a waste product. This is also good for cement, sand, brick and railway sleepers. The Batesville White Lime Company also manufactures agricultural limestone, asphalt filler dust, feeding limestone and poultry grits, several of these products being made from the slag. After the dry lime has been screened thoroughly, the very fine flour-like product is useful in sugar-making. The next finest goes into stock feed, the next into fertilizer, and the coarser into roadmaking material and ballast for railway tracks.

Limedale's Only Store Hub of Community Life.

Twelve-year-old Limedale is not a postoffice town. Residents receive mail on a rural free delivery route from Batesville. There is one general store, with its two gasoline tanks in front and the usual array of groceries and merchandise, an electrically operated ice cream box and a wooden box for ice-cold soft drinks. Ample floor space in the store provides for the crowds of workers who come in on Saturdays to buy groceries and to do their weekly "trading." Most of those employed at the Limedale plant live in the Limedale community. There are 60 to 70 homes, from the smallest three and four-room houses to larger bungalows with dark brown or green trim. They are all white frame structures, and all are wired for electricity. Electric washers and refrigerators are common, as well as automobiles. Lawrence Smith, sales manager at the plant, and his family, former residents, have lived in Batesville the past few years.

A crude white frame building was erected five or six years ago for use as an interdenominational church to provide a Sunday school for the children. "Slim" Swain is in charge. The storekeeper, M. M. Morris, who was victim of infantile paralysis many years ago, is a director of the nearby rural district school. Almost the entire attendance of this school is comprised of the children of Limedale.

not totally.
To Expand Survey.

WPA authorization for the survey has been granted only for work in Hot Spring County, but preliminary work has been done and permission has been requested to exploit Saline and Pulaski County deposits and it is reasonable to believe that it will be granted.

Loosely speaking, the term limestone is applied to marble, calcite, chalk and limestone proper. These ores, subjected to a heat of some five to six hundred degrees centigrade, have all their carbon dioxide contents dispersed and become pure lime. This is used in the preparation of aluminum.

With the primary survey to be conducted in the three counties mentioned, it has already been established that there are valuable limestone deposits of undetermined quantities in other Arkansas counties, namely Washington and Independence, near Fayetteville and Batesville. Prevailing high freight rates make these deposits impractical for immediate use, but they will remain as stand-by reserves in case of emergency.

Says Lime Plentiful For Alumina Plant

Special to the Gazette. 8-17-41

Harrison, Aug. 16.—North Arkansas lime quarries are capable of supplying daily the 250 to 1,000 tons of lime necessary for the operation of the \$21,000,000 alumina plant in Arkansas, L. A. Watkins, president of the Missouri & Arkansas railway, reported today.

Mr. Watkins said that lime is found along a 132-mile stretch of the railroad in north Arkansas. A 100-ton plant already has been established south of Valley Springs, and other plants could be built quickly, he said.

He said the lime in the vicinity of the former kiln at St. Joe tested 98 per cent pure, and lime on some other ledges had tested 99 per cent pure.

Survey Will Be Made to Select
Quarry Sites.

Gazette 11-8-41

An economic survey to determine potential quarry sites in north Arkansas's Pitkin limestone formations is being started by Howard Miller, state Geological Survey engineer, Dr. George C. Branner, state geologist, said yesterday.

Numerous inquiries about limestones have been received, Dr. Branner said. The Pitkin or Mississippian lime has not been used extensively.

Mr. Miller's work follows a report, "The Pitkin Limestone in North Arkansas," by William H. Easton, now of the Illinois Geological Survey. The Pitkin formation, which averages 100 feet in thickness, extends from the Oklahoma line to a point near Batesville, crossing most of north Arkansas. Its calcium content is high.

Arkansas produced 87,627.35 short tons of limestone in 1940. From 1839 to 1939, production was 4,183,082 short tons valued at \$10,743,850.

Gas Piped To Plant At Limedale

Special to the Gazette. 12-7-41

Batesville, Dec. 6.—A new gas line has just been completed from here to the Batesville White Lime Company's plant at Limedale, three and a half miles west of here. The firm will start using gas in some of its kilns instead of wood within a few days and expects to increase its production with the new fuel. The gas is being furnished by the Mississippi Fuel Corporation.

The line starts out with six-inch pipe, tapering to four inches at the plant end. It will have a capacity of approximately 6,000,000 feet. The lime plant will consume approximately 1,000,000 feet a day at first and probably much more later. Gas will replace wood and mixed fuel. During recent months some coal has been used with wood.

For many years the company operated on wood, but it has con-

sumed so much, that the supply so has diminished within reasonable hauling distance that there is not enough left to supply the mill. Experiments with gas in lime burning have been successful, showing more production than wood.

ALUMINA PLANT MAY OBTAIN LIMESTONE IN QUANTITY NEARBY

Gazette 12-14-41

With the clearing of land for the erection of an aluminum oxide plant near Bauxite under way, interest has been attracted to a special investigation of calcite deposits between Malvern and Hot Springs, nearing completion by the state Mineral Survey as a WPA project, sponsored by the Arkansas Geological Survey.

The tonnage of limestone necessary for the manufacture of aluminum oxide is approximately one to two, a plant with a production of 500,000 tons of alumina per year requiring about 250,000 tons of limestone during the same period.

Although limestone occurs in several areas in central Arkansas, it never has been quarried in any quantity there, and has been shipped in from northern Arkansas, either as crushed limestone or building stone, as it is found in the Ozarks in practically unlimited quantities. Chalk or earthy lime deposits of large size also occur in southwestern Arkansas.

The calcite which occurs in Magnet Cove is a crystalline form of limestone, and is suitable for the manufacture of caustic soda, which is required in the manufacture of aluminum oxide.

The total amount of calcite available in this area has not been determined definitely. Ten holes have been drilled and three of the holes encountered a thickness in excess of 45 feet or more of calcite. The supply available probably will total several hundred thousand tons.

Frank V. Stevenson of the state Geological Survey is co-ordinator of the project and has located the drill holes.

Magnet Cove Limestone Mill Planned

Special to the Gazette. 1-19-42

Magnet Cove, Jan. 18.—A 200-ton limestone crushing plant will be constructed soon at the site where successful tests recently were made by the state Mineral Survey, John O. Willson, of St. Joe, head of the Magnet Cove Lime Company, announced here.

Mr. Willson was president of the former St. Joe Lime and Stone Company, which operated a limestone crushing plant at St. Joe until it burned.

Operating on a 54-acre tract leased from Joe Kimzey, the firm will supply agricultural lime for distribution by the AAA and will submit a bid on supplying the limestone which the alumina plant on Lake Catherine will require. The firm was low bidder on supplying agricultural limestone for AAA clients in approximately 30 counties in this section. The AAA furnishes the limestone to farmers in lieu of cash payments.

Tests at the Magnet Cove site by the state Mineral Survey, made as a WPA project under the sponsorship of the Arkansas Geological Survey, revealed deposits of several hundred thousand tons of almost pure calcite. Dr. George C. Branner, state geologist, said one ton of limestone will be necessary in the production of two tons of alumina, a plant of the proposed 500,000-ton (alumina) capacity requiring 250,000 tons of limestone.

Magnesium In North Part Of State

Special to the Gazette. 4-6-42

Mountain Home, April 4.—Besides aluminum, which is derived from bauxite ore of which Arkansas produces about 95 per cent of all that is produced in the United States—Arkansas could produce large quantities of magnesium, another rare metal badly needed now in plane production in the defense program. In another form magnesium also is used for flares and signals.

The source of magnesium in Arkansas lies in the immense deposits of dolomites, in the north part of the state. They might be classed as carbonates, a compound of carbonate of lime and magnesia. Metal is obtained from the dolomites by an intricate chemical process with which none of the mining men or quarry men of the north part of the state is familiar.

Adaptable for Cement.

Besides being the source of magnesium, north Arkansas dolomites are adaptable to the manufacture of cement. Reports from Eastern cement manufacturers show that the cement they make from this material exceeds in strength most of the other cement made in the world. Comparison of analyses made from the Eastern stone and that of north Arkansas, shows in several instances that north Arkansas dolomite is the better. No cement, however, ever has been manufactured from the north Arkansas stone.

Magnesium as a metal has the appearance of silver, and remains unchanged in dry air. In ordinary atmosphere it tarnishes a little. It is malleable and ductile but has little tenacity. It has a specific gravity of 1.75, which is lighter than aluminum whose specific gravity is 2.6. It fuses and distills at about the same temperature as zinc. Its lightness is what gives it its present value in the construction of planes.

Used In Construction.

About the only use to which these dolomites or magnesian lime stones have been put in the north part of the state has been for building and other construction purposes. Many of the older buildings in Berryville, Eureka Springs, Huntsville and other towns are built with it. During the early days it was popular for building material, and much of it was shipped out of the area to Kansas City, Springfield, Mo., Joplin and other Mid-western cities. Besides being used for buildings it also was used for flagstones, sewer caps and curbing. It was popular for these uses because it worked easy and is durable.

Deposits of magnesian limestones in north Arkansas are tremendous, covering most of the mountain section of the state. It outcrops in the eastern part of Benton county along the White river and its tributaries. A fine quality of it is exposed in the King river valley north of Berryville and east of Eureka Springs. It also occurs in the Osage and King river valleys above the confluence of those streams. It outcrops in Carroll county near the state line, and occurs in large deposits on all of the tributaries of the White, which flow from the south between Long and Crooked creeks. In the Buffalo river valley it outcrops from Tomahawk creek to White river, and on south and east for many miles. It also occurs in Lawrence and Sharp counties.

It is hardly likely that all of the deposits would be suitable for the extraction of magnesium. They would have to be chemically tested for their magnesia content and for foreign matter that might be a detriment.

Fourteen chemical tests made during an early investigation of these deposits show that the carbonate of magnesia runs from 24.02 to 42.32 and carbonate of lime from 32.25 to 56.58, a well balanced stone product of its kind.

Lime Plant at Batesville To
Increase Production.

Special to the Gazette. 6-7-42

Batesville, June 6.—Many improvements are being made at the Batesville White Lime Company's plant at Limedale to increase production. All the six big kilns are being fired with gas. Kilns and quarries are being electrically wired

to permit night work. They expect to be on three shifts a day soon. Three hundred and seventy-five tons of lime will be used daily at the new aluminum plant at Benton, and the Batesville firm will furnish a part of this. There also is a big demand for crushed stone for use in construction of munitions plants and air fields.

Gazette 2-23-45
From Ozark Caves to Caverns
In Holland.

In the limestone caves near Valkenburg, Holland, the rear echelon of the 102nd or Ozark Division of the United States army established barracks and stored supplies. Since the days of Roman occupation, when Caesar's legions were quartered there, these caverns have been used for many purposes. When the Germans had a rocket bomb factory in the underground shelters they put in plumbing, air conditioning and fluorescent lighting systems.

Many of the limestone caves in the Ozark region, from which members of the Ozark division came, do not need air conditioning. Some caverns have an even temperature the entire year; others are cooler in summer and warmer in winter than the temperature outside. Underground streams and springs give a continuous supply of pure water. The mechanical and chemical action of sub-surface waters cut most of the passages in the limestone country of North Arkansas and South Missouri. The Ozark caverns range from shallow openings in the bluffs to mazes of galleries and rooms, such as Diamond Cave in Newton county, Arkansas.

Possibly Indians were living in some

of the Ozark caverns during the time Roman soldiers barracked in the caves of Valkenburg. Although archaeologists have not succeeded in dating the aboriginal occupations in the Arkansas-Missouri highlands there is some evidence of an early period of human habitation. In one cavern stalagmites, or deposits of calcium carbonate left on the floor by dripping waters, show successive rings of ashes from Indian fires. It is a well established fact that at least two Indian groups lived in the caves. The last people may have been the Osages and their close relatives who roamed through the region during pioneer days.

In some cases white settlers occupied the caverns, and during the Civil war the caves sheltered members of both armies, as well as renegades and refugees. Confederates mined floor deposits for saltpeter which they needed in making gunpowder. An Ozark farmer today may use a nearby cave for a stable or a milkhouse. Several wineries age their products in the natural underground rooms. One Arkansas cavern was turned into a night club.